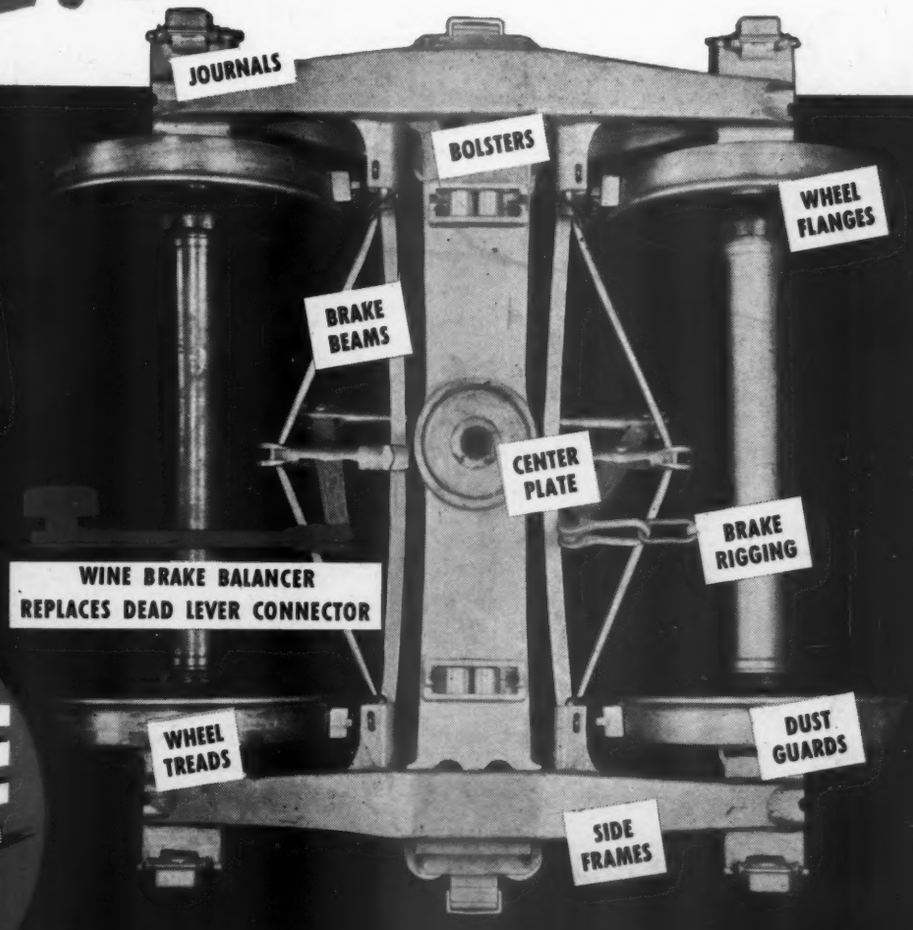
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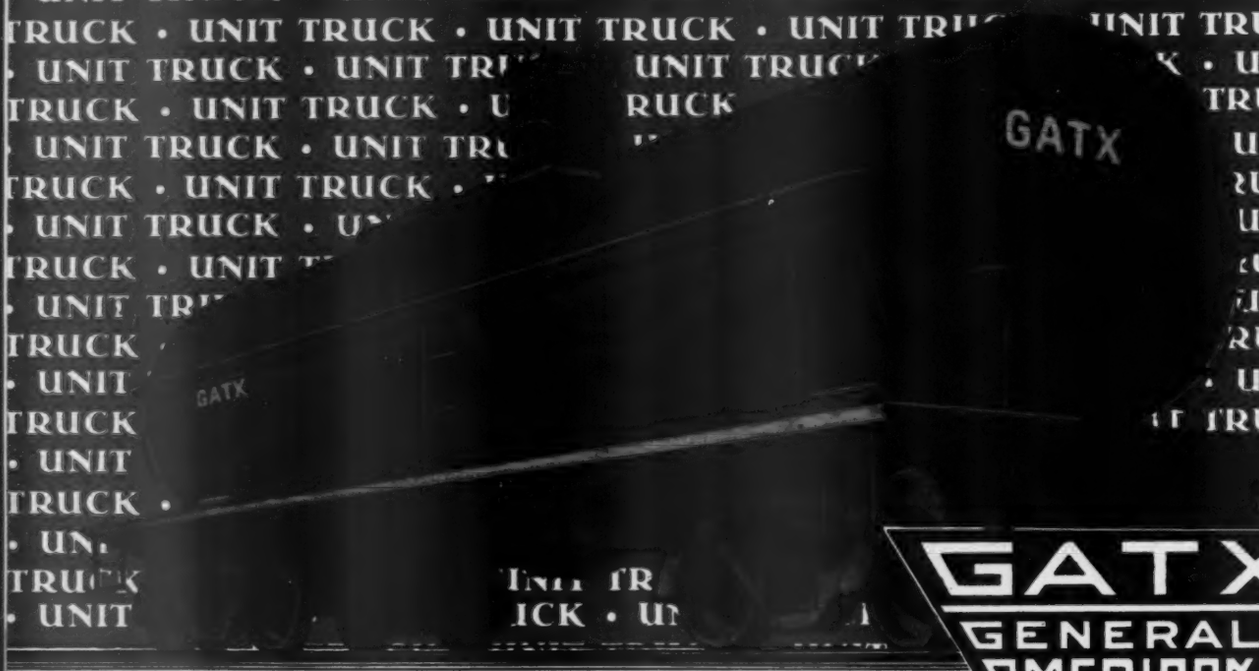
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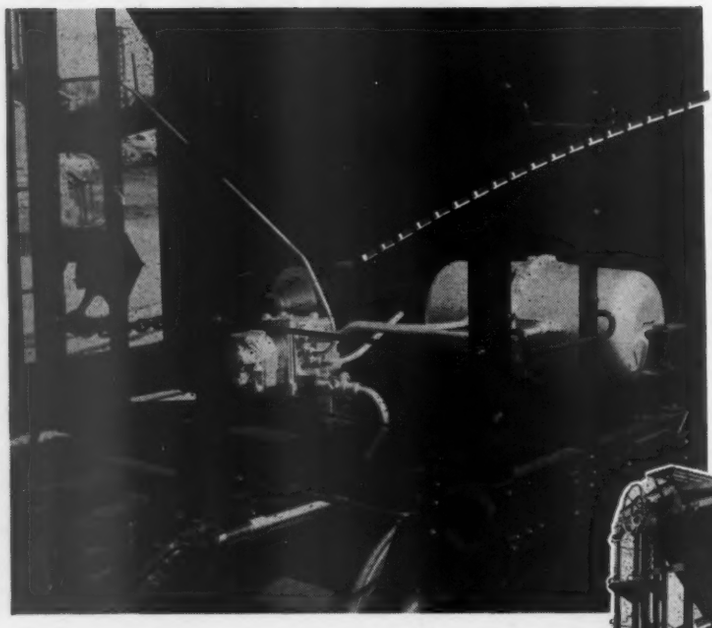
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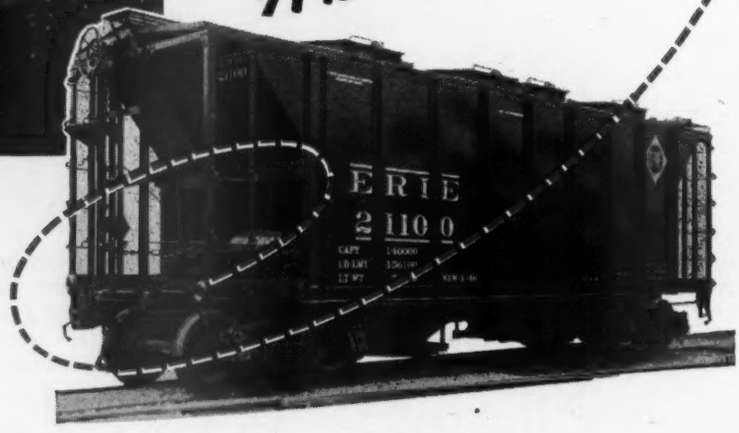
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A "Stand-out" in durable AB installations



Byers Wrought Iron Brake Pipe

As part of a new car building program, the Erie Railroad recently ordered 700—50-ton Box Cars, 600—50-ton Drop End Gondolas and 100—70-ton Covered Hoppers. The railroad specified wrought iron pipe for the AB brake piping on all these cars. The installation on one of the Covered Hoppers, built by Greenville Steel Car Company, is shown above. The pipe is Byers Wrought Iron.

With half a million or more AB brake installations in prospect in the near future, the savings possibilities of Byers Wrought Iron Brake Pipe, both in installation and in service, take on added importance and significance. Byers Wrought Iron Brake Pipe has shown its ability to stand the severe short-radius bends necessary during installation. The absence of "spring-back" simplifies fitting, and leaves the assembly free of harmful stresses. Finally, the hickory-like structure of wrought iron protects it against the premature fatigue failure that vibration and shock cause in ordinary vulnerable materials.

The desirable properties of Byers Wrought Iron come direct from the unique character of the material. Tiny fibers of glass-like silicate slag, threaded through the body of high-purity iron, give a structure something like that of a stranded wire cable. When corrosion is present, the fibers serve as baffles, to halt and diffuse the attack, and so discourage pitting.

Our General Catalog will give you full dimensional information on Byers Wrought Iron pipe. May we send you a copy?

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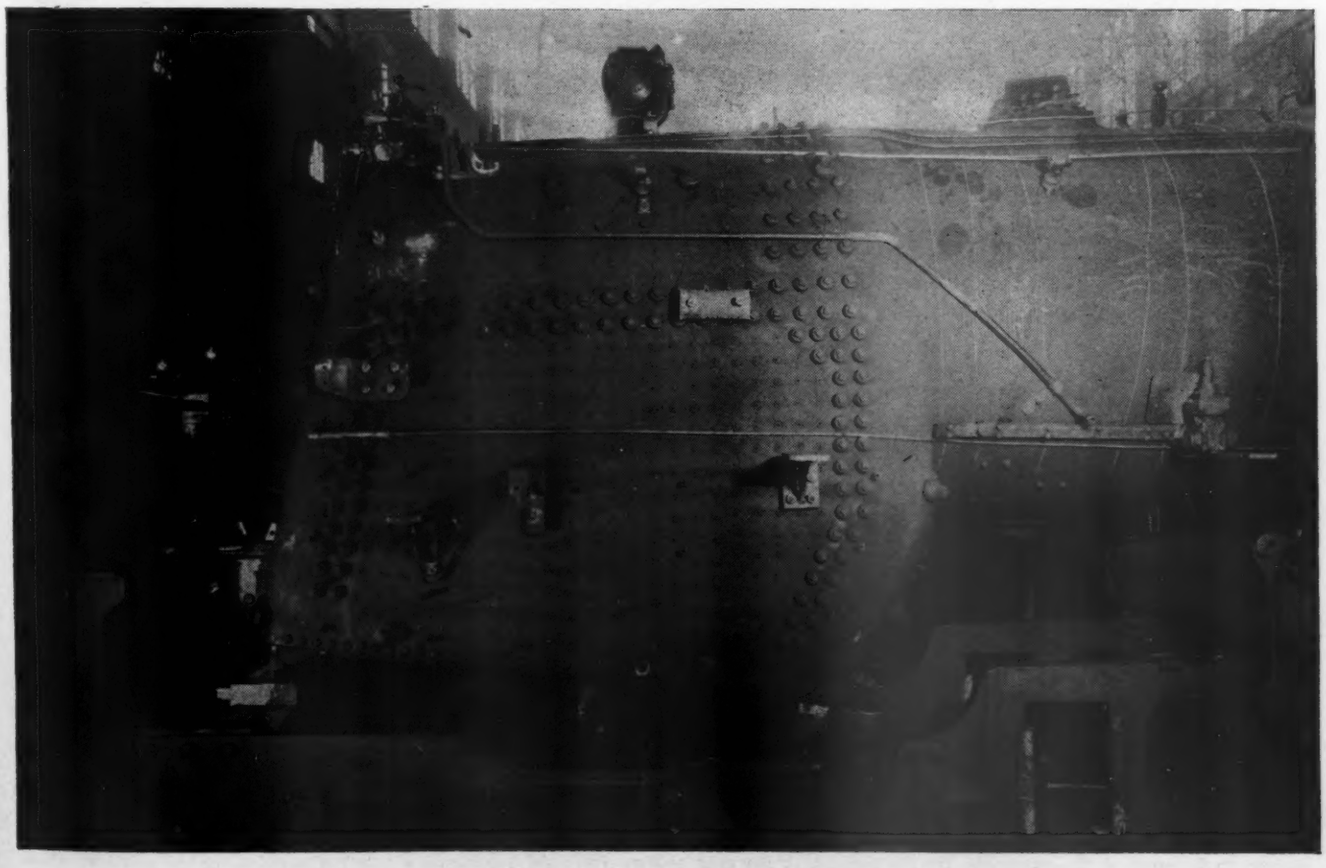
Alco All-Welded Boilers

Welding, stress-relieving and inspection equipment installed and procedures established by the American Locomotive Co. at its Schenectady plant for the building of all-welded boilers

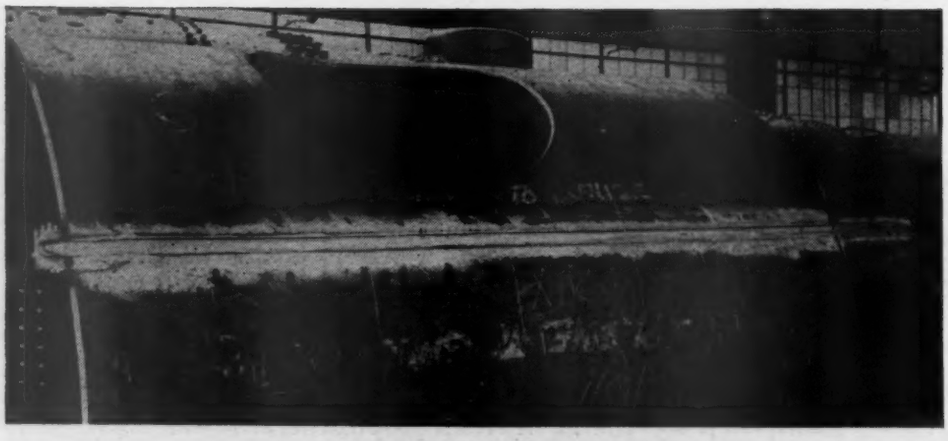
ANTICIPATING an increasing demand for all-welded boilers, the American Locomotive Company has installed at its Schenectady, N. Y., plant the welding, stress-relieving and inspection equipment that permits this builder to meet the exacting requirements for the fabrication of boilers by fusion welding. This equipment is designed as well for the improvement of the welding facilities that were used in making the all-welded boilers already in service and for the placing of the production methods on a more efficient basis.

In every phase of the welding process, from operator and procedure qualifications to final inspections, the practices are designed to meet or exceed the American Society of Mechanical Engineers' locomotive boiler code provisions. Prior to 1946 the one essential part of the equipment that was lacking at the Schenectady plant, and which was required for the observance of these code requirements, was a furnace of sufficient capacity to stress-relieve a complete boiler. The first all-welded boiler, built for the Delaware & Hudson in 1937 by the American Locomotive Company was stress relieved at the Chattanooga, Tenn., plant of the Combustion Engineering Company, Inc., because the Alco furnaces were too small for a complete boiler. Now the Schenectady shops have a furnace capable of holding the largest boiler. In addition, special equipment for use during automatic-welding operations has been installed. These new features supplement the testing laboratory, X-Ray and automatic-welding facilities that have been available for some time.

To describe the welding equipment, the methods used in the construction of one of the two all-welded boilers delivered to the Canadian Pacific early in 1946 will be



Firebox end of all-welded boiler completed early in 1946 for the Canadian Pacific



Starting plate is at the left and a test coupon at the right of completed longitudinal we'd



New rolls for rotating the boiler courses during the welding of the girth seams



General arrangement of the equipment for the welding of the girth seams—This weld is being made with the boiler on the old rolls with which the compensating ring was used—A technician at the isolated controls guarantees the constancy of voltage and amperage for the welding process



Welding a longitudinal seam—The first pass is made on the outside, the second and last pass on the inside

explained in the sequence in which they were used. First, procedure qualification and operator qualification tests must be made and approved before the actual boiler fabrication can be started. Procedure qualification determines the suitability of the welding technique employed in the shop and covers the welding apparatus, electrodes and plate material. After the welding technique is approved, tests are made to establish the operator's ability to produce sound welds under conditions similar to those that will exist during the actual welding of the boilers. At Schenectady, permanent records of the procedure and operator qualification tests include certified forms giving all pertinent data, and photographs of test specimens with identifying markings made after the tests were completed.

In the forming and fitting-up of the plate prior to welding, a maximum tolerance of 0.015 in. is permitted in the gap between the edges. This precision is particularly important because automatic welding, unlike manual welding, can not be changed continually to accommodate varying conditions—and automatic welding is utilized wherever possible because it produces a more uniform and better weld. The fit-up with the 0.015-in. tolerance is assured on the longitudinal seams by machining the edges on plate planers. After the longitudinal seams are welded, the faces of the circumferential seams are trued by grinding to permit the close fit-up of the girth joints. Clean-up grinding of the plate edges is also done in order to minimize repairs. The plates are held in position within the tolerance limit by means of bolts that are slipped through nuts tack welded to the inside of the courses and then tightened. After being drawn into position by the bolts the edges of the plate are tack welded to maintain the fit-up during the welding process.

Welding of Seams

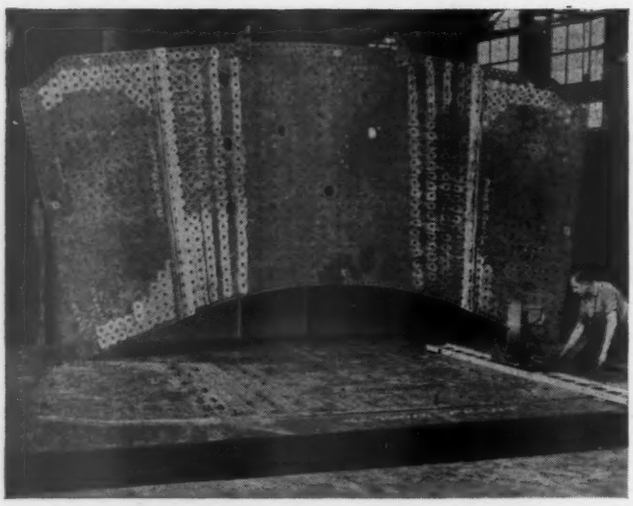
The outside of the longitudinal seam is joined in one pass by automatic welding equipment moving on tracks laid along the seam. During this operation the mechanic's helper holds a copper back-up on the inside of the course as a precaution against a possible blow-through. The inside of the shell-course seam is welded in the same manner after the bolts and tack welds are removed. It should be noted that small plates attached to the course at the ends of the seam are used for starting and stopping the welding process, and at one end the plate becomes a test specimen. A test specimen for each longitudinal weld is prepared. To meet the code requirements the plates for test samples must be from the same lot of material that is used in the boiler and must be attached to the boiler course so that the specimen's edges are a continuation of and a duplication of the corresponding edges of the longitudinal joint. Furthermore, the weld metal must be deposited in the test plates continuously with the weld metal in the longitudinal joint. After the welds are completed both sides of the seam are ground and the outside marked off for X-ray, the procedure for which will be explained later.

The welding of longitudinal seams at Schenectady is one phase of the welding operation that the American Locomotive Company had developed on a production basis during the war. In 1944 a bottleneck existed in the bull-riveting capacity at this plant, a condition that was delaying the production of several hundred boilers for the Russian government. To expedite the work permission was obtained to weld the longitudinal seams of these boilers and this experience has been particularly valuable in the setting up of the equipment and procedures for all-welded boilers.

The front flue sheet was welded in manually after the longitudinal seam of the first course was completed. This sheet is not joined directly to the first course but is welded to a ring and is reinforced by several gusset braces, the design being similar to that used in the first all-welded boiler made in 1937 for the Delaware & Hudson.

The steam dome presents some difficulties to automatic welding because of its irregular shape. Even so, the repairs and the resulting distortion of the dome due to manual welding indicated the desirability for the automatic welding of this part. Consequently, a special small automatic welding machine was fitted for the job and in this particular boiler only 1¼ in. of the dome welds had to be repaired. The boiler was rotated as this operation progressed so that the weld was made in a level position at all times.

The roof and side sheets were laid out on a flat table and welded as a sub-assembly to simplify the fitting-up and the rolling operations.



The roof sheet is welded to the side sheets flat

A point of particular interest in all the welding operations is the control of amperage and voltage by a technician and not by the automatic-welding machine operator. In this way the operator can concentrate on the weld in progress while the technician maintains the welding conditions, the latter being guided by the procedure established for the joint being welded.

In welding the circumferential seams for the Canadian Pacific boilers old equipment for rotating the boiler courses was used. This equipment, now replaced, consisted essentially of three sets of rollers, on which the boiler courses rested, and a power source. The power was supplied by an electric motor connected by a shaft to the back flue sheet and controlled remotely by the welding-machine operator. One of the difficulties that has to be overcome in the rotation of the boiler sheets is the eccentricity of courses such as the non-uniformly tapered dome course. This eccentricity required the introduction of a large ring around a cylindrical course in order to maintain an even welding speed. Also, when rotating the boiler with the firebox attached the off-set of the firebox sides resulted in an uneven distribution of weight throughout 360 degrees of rotation and again made the control of welding speed difficult.

New means of rotating the boiler during the welding of the girth seams consist of three sets of rollers mounted on small cars that can be positioned by moving along a permanent track. One of the roller sets is powered for rotating the boiler; one is an idler set, and the third is also an idler but is designed to eliminate the need for a ring to compensate for the eccentricity of courses. This set of rollers, like the other two, can be adjusted transversely of the boiler through power drives. In addition, the third set of rollers adjusts itself automatically to changes in weight distribution due to the eccentricity of the boiler and thus it can compensate for these differences. This automatic control is obtained by the use of pressure switches.

Prior to welding the girth seams the joint faces of each course are trued by a grinding machine designed especially for this purpose. This machine has two adjustable grinding wheels, each with an individual motor drive. The center shaft of the machine and the cross member on which the grinding wheels are mounted makes a horizontal T-shaped arrangement, the wheels being mounted near each end of the top line of the tee. The grinding wheels can be moved along the cross member to suit any boiler-course diameter.

The outside of the girth seams are welded by a machine supported over the top of the boiler. The inside welds are made by a machine supported by an adjustable boom that is extended into the boiler. The welding heads remain stationary during the girth-seam welding operations while the boiler is rotated. Again, the joints are ground in accordance with the code provisions and marked for the X-raying. The grinding removes irregularities in the weld surface so that it merges smoothly into the plate surface. A maximum reinforcement of $\frac{1}{8}$ inch after grinding is maintained, this amount also being permitted by the code provisions.

X-Ray Procedure

X-ray pictures of all outside butt-welds are made to insure the welds being free from inclusions and porosity and as near perfect as possible. Prior to the X-raying, lead numbers at 2-in. intervals on cloth strips are attached to the boiler parallel to the seams and near enough to the welds so they will show on the 4½-in. by 17-in. X-ray negatives. These numbers and arrows pointing to prick-punch marks on the boiler are used to locate accurately any defects. The numbers start at the front end of the boiler for the longitudinal seams and, facing the front of the boiler, they run clockwise from the longitudinal welds for the girth seams. The prick punch marks, two per X-ray exposure, serve as a permanent means of locating defects. If a defect shows up on the X-ray negative, the negative itself is placed on the boiler and positioned exactly by placing the prick-punch marks on the negative over those on the boiler. Then a center punch driven through the defect showing on the negative places a prick-punch mark on the weld at the location of the defect. This particular procedure for locating defects on welded boilers is a direct result of experience obtained in the production of combat tanks during the war.

Each negative shows a 15-in. section of the longitudinal weld which permits a 2-in. overlap of each picture because the negatives are 17-in. long. The girth seams are X-rayed in 8-in. or 10-in. sections in the same manner. The picture of the dome welds is taken by one exposure. Duplicate pictures of each weld section are made to eliminate the possibility of spots on a negative being judged as defects. Alco has established a higher X-ray standard than that required by the A. S. M. E. locomotive boiler code. Any defects outside the limits of this standard are removed and rewelded. After rewelding, new X-rays



Welding the dome with an automatic machine



The stress-relieving furnace

are made to insure that the repairs have removed the defects.

The completed boiler shell is stress relieved as a unit in conformity with the code requirements. The furnace installed at Schenectady for this purpose is 80 ft. long by 12 ft. square inside. It is equipped with an electrically driven car upon which the boiler is set and the top of which is lined with fire brick, as this car becomes the bottom of the furnace during the operation of the unit. Both the car and furnace-door positions are controlled by push buttons located to the side of the door. The furnace is heated indirectly by four combustion chambers, each of which has four oil burners, the hot gases being distributed evenly throughout the furnace by means of fans that drive them through ducts and louvres. One burner per combustion chamber is checked by an electric-eye control which will shut off the fuel-oil supply to that chamber if the flame should be extinguished. The furnace is equipped with a program control.

Program Control

This control of the furnace operation has four functions which it performs automatically. It controls the rate at which the furnace temperature is increased; it maintains the furnace at the predetermined soaking temperature for the prescribed length of time; it decreases the furnace temperature at the prescribed rate, and it does not permit the temperature differential between the thinnest and thickest boiler sections to exceed a set amount, 37½ deg. in this instance. In addition to four thermocouples attached to the boiler for temperature control and two used at the thickest and thinnest boiler-plate sections for temperature-differential control, eight thermocouples are available for recording temperatures.

After stress-relieving the shell, the inside firebox, flues and tubes are installed and the boiler is given hydrostatic and hammer tests. The hydrostatic test is made with a pressure one and a half times that for which the boiler was designed. To pass this test the boiler must be absolutely tight.



X-raying the throat-sheet connection—All outside butt welds are X-rayed to insure the detection of all defects

Large or Small

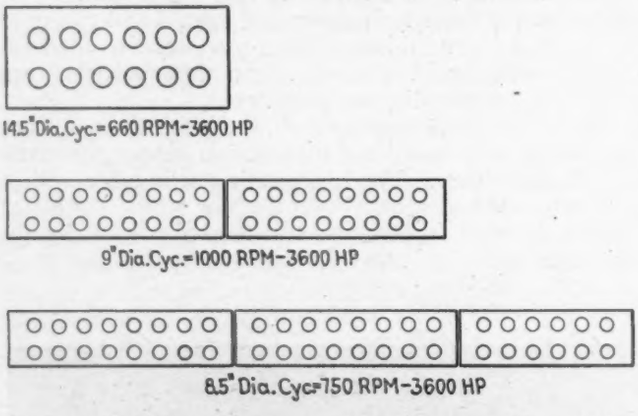
Cylinder Diameter*

By Ralph B. Miller †

Dual-pressure, intercooled, turbocharged, four-cycle engine built as two six-cylinder units could develop 3,750 b.hp. in 13 ft. length

THERE is not, today, a single high-power Diesel-electric locomotive on an American railroad. What we see is a string of as many as four small locomotives coupled together with some camouflage tinware to give the appearance of a single unit.

This development shows the influence of automotive practice which has dictated the use of relatively small high-speed engines. The design has been based on the assumption that a great number of standardized lightweight parts easily replaced or repaired are preferable in railroad service to a smaller number of larger parts requiring no attention between regular scheduled shopping periods. The automotive background led to the assumption that the Diesel engine is unreliable in performance and subject to sudden and frequent breakdowns. Hence, it is necessary that the component parts be of such small



Comparative sizes of engines of same horsepower with varying cylinder diameters

size and lightweight that one man and a helper can carry out major repair work at terminals or even under way.

Small cylinder diameters force the use of high rotative speed and rotative speed is the enemy of reliability. Combustion pressures increase with speed. Stresses in many of the most difficult mechanical parts increase with the square of the rotative speed. Combustion efficiency, in spite of the high combustion pressures, falls off rapidly with increase in rotative speed. Friction, likewise, increases rapidly.

Obviously, the high-power locomotive engine should be designed to have the maximum piston area per foot of engine length in the cab. The second requisite is selection of a combustion system or cycle which will develop the greatest horsepower per square inch of piston area.

The modern intercooled dual-pressure supercharged four-cycle engine will develop 1.82 hp. per sq. in. of piston area at the conservative rating of 1,600 ft. per min. piston speed and 150 b.m.e.p. The best records available show an output of only 1.45 hp. per sq. in. piston area for the two-cycle engine with small margin of safety.

The highest ratio of piston area to unit of cab length on record anywhere is found in a transfer locomotive built by the General Electric Company Erie Works some 14 years ago. Two engines are installed side by side. These have a piston area of 158 sq. in. per foot of cab length taken up by engines.

Two six-cylinder engines of this type, side by side, or built on a twin base with two crankshafts, turbocharged with the dual-pressure intercooled system would have an output of 3,750 b.h.p. at a rotative speed of only 600 r.p.m. Combustion pressures and total heat dissipation to the cooling water would be comparable with that of the normal non-supercharged engine at 80 b.m.e.p. or about 47,000 B.t.u. per minute. The engine proper would be 13 ft. long.

A well designed engine of this type will, under normal conditions, operate in main-line service no less than 10,000 hours without the necessity of removing a crankcase door or lifting a cylinder head. It will give continuous and uninterrupted service between the scheduled overhaul periods and is not designed merely for the convenience and accommodation of a traveling repair crew.

Reliable and dependable performance is of utmost importance in main-line service and engines must be designed as to size, arrangement of cylinders, selection of cycle, etc. with that single object as a goal. Cost, while important, is secondary because over a period of time an unreliable engine is the costliest to manufacturer and user alike. Only those manufacturers who can transfer profits from other operations can continue to put out such products and survive.

One well-known Diesel locomotive builder, after an unsuccessful attempt to use a half-dozen or more package units in a high-power locomotive, has wisely returned to a larger cylinder bore.

It is also interesting to see that the latest Diesel engine manufacturer to enter the locomotive field has adopted a 14½-in. bore for high power. This engine is offered in an eight-cylinder unit at a rating of 2,200 hp. and a rotative speed of 660 r.p.m. It is supercharged with the conventional Buchi system to 135 b.m.e.p. This may prove too high for heavy-duty main-line service, but this size of engine has interesting possibilities. Built in a 12-cylinder twin unit and supercharged with the dual-pressure intercooled system, it would develop 3,700 hp. on a basis of conservative rating. The weight of this engine would be about 20 pounds per horsepower when built in steel and cast iron.

The length required for engines proper for an output of 3,600 b.hp. is shown schematically in the drawing,

(*Continued on page 346*)

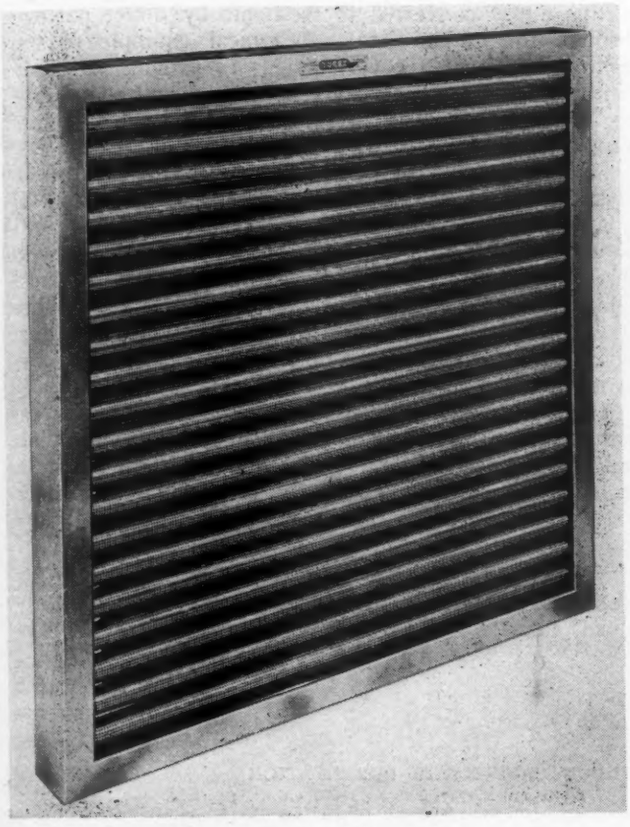
* A paper presented at the A. S. M. E. Oil Gas Power Division meeting held at Milwaukee, Wis., June 12 to 15.

† Nordberg Co., Milwaukee, Wis.

Car Air Purification

By F. H. Munkelt *

Activated-carbon air recovery units remove the odors from recirculated air and maintain an agreeable air quality without increasing the conditioning load



Dorex panels have perforated tubes containing the activated carbon

ONE of the most stubborn problems faced by designers of air-conditioned railway cars has been the provision of adequate car ventilation while still maintaining comfortable car temperature. Railroad cars must carry their air-conditioning plants "on their backs"—each car having its own individual system. Limitations of power, weight and, particularly, space for the conditioning apparatus restrict the air-circulating capacity for the average 64-passenger coach to between 2,000 and 2,400 cu. ft. of air per min., of which, for the same reasons, not more than 25 per cent or 500 to 600 cu. ft. per min. can be outdoor air make-up, the balance being recirculated. This means that less than 10 cu. ft. per min. (usually nearer 7½ cu. ft. per min.) of fresh air per occupant is added, whereas, by recognized ventilation practice, the very minimum that will maintain agreeable air quality is 15 cu. ft. per min. per non-smoking and 30 cu. ft. per min. per smoking passenger.

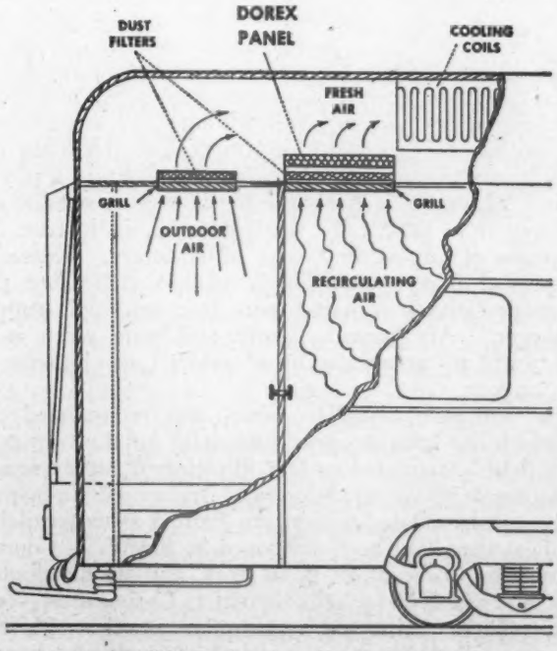
The problem is aggravated in dining, club and lounge-tavern cars where the added accumulation of odors from food, beverages and smoking requires a ventilation rate equivalent to 30 cu. ft. per min. or more per occupant. Likewise, in room cars designed for a normal occupancy of 22 to 24 passengers as many as 50 or more persons may congregate at times—both en route and, more particularly, in terminals when visitors are aboard. After such groups disperse, the stale, odorous air, 75 per cent of which is constantly being recirculated throughout the rooms, becomes a source of discomfort. On occasion, these odors are so pronounced at the end of a run that deodorant sprays are used to mask their effect.

* Vice-president, W. B. Connor Engineering Corporation, New York.

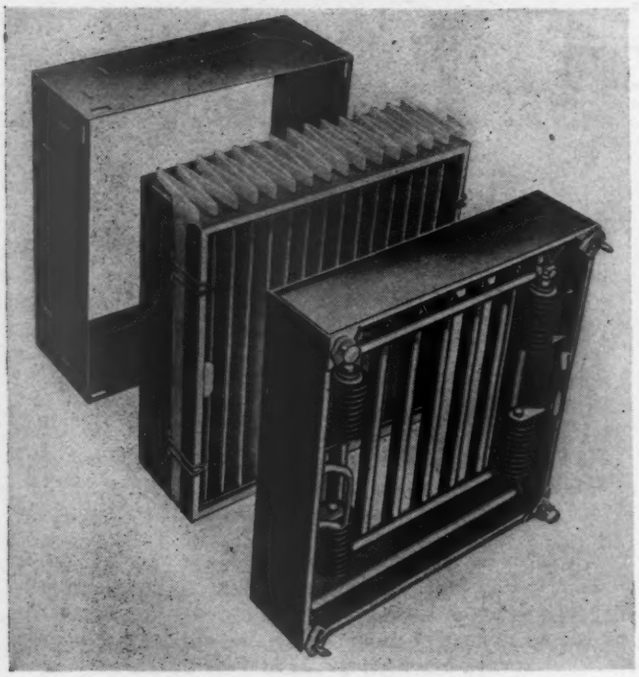
More Outside Air Not Necessary

Railroad air conditioning engineers have long known that adequate ventilation—sufficient fresh air—offers the only cure for these conditions but, if the requisite volume of *fresh* air must be exclusively *outdoor* air, the conditioning load it imposes becomes prohibitive. In other words, over and above carrying the fixed internal load (heat gain or loss, radiation, infiltration, etc.) the conditioning plant that can be accommodated (7 to 8 tons of refrigeration capacity) is adequate for only an outdoor air load not exceeding 25 per cent of the total air. Fortunately, however, a solution has been found and is being adopted by railroads and car builders alike. This solution consists of purifying and thus converting recirculated air to fresh air in an amount sufficient to compensate for the ventilation deficiency and, consequently, without increasing the conditioning load.

The volume of outdoor air ordinarily introduced into



Installation of activated-carbon panels



Ionizer, filter medium and casing of electrostatic filter

they are installed or removed with the same facility as the latter. Each panel contains one or more rows of evenly spaced, perforated, carbon-filled metal tubes housed in a frame designed so that a maximum adsorbing surface is exposed with a minimum resistance to air flow. Return air passes uniformly through the entire surface area of the panel and a definite percentage of this air is converted to fresh air by direct passage through the carbon bed. A typical example of the application of air recovery panels to provide adequate ventilation in a railway car (smoking permitted) carrying an average of 64 passengers is given in the accompanying table.

Activated carbon efficiently removes the source of irritation in tobacco smoke, pyridine, and acid gas. If it is desired to eliminate the smoke haze (solid matter) as well, this can be accompanied very effectively with a recently developed electrostatic air filter. A replaceable, electrically charged cellulose filter, each tiny fibre of which acts as a magnet for previously ionized dust particles, is a well-nigh impenetrable barrier for airborne dirt.

The cost of activated carbon air purification is remarkably low, about 2½ per cent of the entire air conditioning cost. In a 64-passenger coach, for example, each passenger receives nearly three times as much fresh air as formerly. Carbon air recovery panels are

Activated-Carbon Air Filtration—A Typical Example

STANDARD VENTILATION REQUIREMENTS FOR COMPTORT

Passengers smoking	(½) = 22 x 30 cu. ft. per min. =	660 cu. ft. per min.
Passengers not smoking	(⅓) = 42 x 15 cu. ft. per min. =	630 cu. ft. per min.
Total fresh air needed		= 1,290 cu. ft. per min.
and Fresh air required per passenger	= 1,290 ÷ 64 =	20 cu. ft. per min.

VALUES IN AIR-CONDITIONED CARS—WITHOUT CARBON AIR PURIFICATION

Recirculated stale air	= 25 per cent of 2,400 cu. ft. per min. =	600 cu. ft. per min.
Fresh air	= 75 per cent of 2,400 cu. ft. per min. =	1,800 cu. ft. per min.
and Each passenger gets	600 ÷ 64 =	9.4 cu. ft. of fresh air per min.—about half as much as needed

VALUES IN AIR-CONDITIONED CARS—WITH CARBON AIR PURIFICATION

Fresh air	= 25 per cent of 2,400 cu. ft. per min. =	600 cu. ft. per min.
Recirculated air recovered by Dorex and reconverted to ventilation air	= 50 per cent* of 1,800 cu. ft. per min. =	900 cu. ft. per min.
Total fresh air available		= 1,500 cu. ft. per min.
and Each passenger gets	1,500 ÷ 64 =	23.4 cu. ft. of fresh air per min.

* Adequate percentage in this case. Percentage can be raised or lowered by installing panels to suit car requirements.

a railway car is more than ample for oxygen replenishment. What is needed is not more oxygen but more *fresh* air, i.e., air that is uncontaminated. Even outdoor air is not always "fresh". Air "quality" or freedom from odors is not affected by oxygen content. From a physiological standpoint a human being's need of outside air for oxygen is practically negligible. This is true for occupants of almost any type of structure. Research has proved that an air supply of one cubic foot per minute per person contains more than an ample supply of oxygen. Air becomes stuffy and stale when it is filled with an accumulation of odors, not because it lacks oxygen.

The equipment used to purify the recirculated air and which has been designed especially for the transportation field is activated carbon filtration, a rather recent development in air conditioning. Individual units that can be accommodated within the limited space available in railway cars have been developed by the W. B. Connor Engineering Corporation, New York, and are distributed in the railroad field by Tuco Products Corporation, New York. These units are rectangular panels with the same over-all dimensions as standard dust filters, and now in use on existing cars and have been specified for a large number being built or planned.

Cylinder Diameter

(*Continued from page 344*)

on the basis of 1.82 b.hp., per sq. in. of piston area for four-cycle engines and 1.45 for two-cycle engines. Cylinder diameters represent typical engines now in use on the railroads or projected designs. The two four-cycle engines have piston diameters of 14½ in and 9 in. and the two-cycle engine 8½ in.

If the Diesel engine is to hold its own in main-line service against the competition of new types of power, present-day performance as to availability and cost of maintenance must be greatly improved.

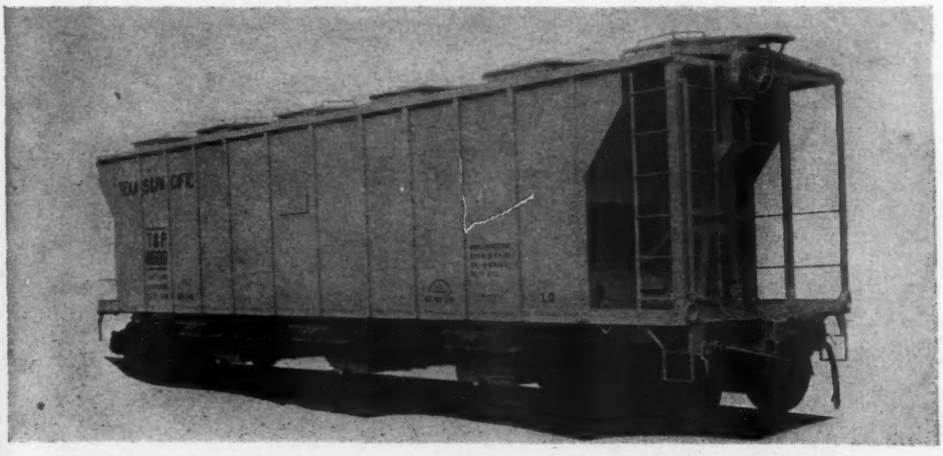
This can be accomplished by adopting supercharged four-cycle engines of larger cylinder diameters and lower rotative speeds than now found in use.

American Car and Foundry Builds

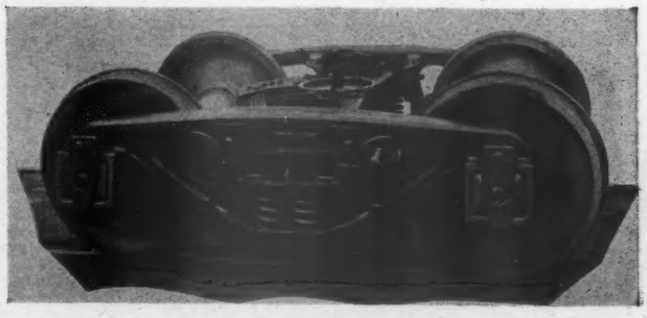
Covered Hopper Car

A TRIPLE-outlet covered hopper car having a nominal capacity of 70 tons and 2,840 cu. ft., a light weight of 57,300 lb. and an overall width based on the A. A. R. unrestricted clearance of 10 ft. 2½-in., has been developed by the American Car and Foundry Company, New York. Fifty cars are being built for the Texas & Pacific and 25 are on order for the St. Louis Southwestern.

The object of increasing the volume is to meet the changes in transportation requirements for shipping bulk commodities, especially where a wide range of weights per cubic foot is involved. The successful handling of bulk commodities in covered hopper cars has been instrumental in broadening the use of such commodities, where weather-proof protection is a requirement. The effectiveness of the car is promoted by dividing the body into three vented compartments which can be unloaded separately or simultaneously, and the possibility of return loading is believed to be increased by its large volume capacity and three pairs of hoppers.



Left: Texas & Pacific 70-ton covered hopper car — Below: The cars are equipped with the American Steel Foundry A-3 Ride-Control truck



As compared with the last covered hopper car developed by this builder, this present design has an increased capacity of approximately 800 cu. ft. when taken to the junction of the roof sheet and the side plate, and 784 cu. ft. to the top of the horizontal web of the side plate. The increase in the light weight amounts to 4,100 lb.

A. A. R. rolled steel zee center sills, section Z-26, weighing 36.2 lb. per ft. are welded together at the top flanges along the center line of the car. Two 6-in. by 3½-in. angles extending from end sill to end sill comprise the side sills. The end sills are made up to two similar-size rolled-steel angles which extend between side sills. Four diagonal braces, consist of 5-in. by 3½-in. angles.

The bolster is a 24-in. 79.9-lb. steel I-beam section running from side sill to side sill across the top of the center sill and securely connected to the center sill and the side of the car. Two ⅜-in. bent plates form the floor support at the bolsters and extend the full width of the car. There are four hardened-steel body side bearings per car located 25 in. from the center line. The side-bearing brace consists of a 10-in. welded, built-up I-section riveted to the bolster and connected to the center sill with 3½-in. by 3½-in. by ⅜-in. angles. An 18-in. tie plate extends from side bearing to side bearing. The drop forged center plates are attached to the center sill and the bolster center filler with twelve ⅞-in. rivets. There are three center-sill spreaders per car, consisting of 6-in. by 4-in. rolled-steel angles at the center of the hopper and ⅜-in. plates at the crossbearers.

The two center partition sheets extend from side sheet to side sheet and from the under side of the roof at the carline to the top of the center sill. A crossbearer web plate of ¼-in. steel flanged at the top is riveted to the bottom of the partition and welded to the center sill and to the 6-in. by ⅜-in. bottom cover.

The four upper crossridge floor slope sheets extend between the car sides and from the partition to a point slightly below the center sill where they are welded to the lower crossridge sheets which extend to the discharge gates. These slope sheets are stiffened longitudinally near the center of the car by two 4-in. by 8.2-lb. Z-bars, and at the sides by 1¾-in. by 1¼-in. rolled-steel angles. The transverse stiffeners are 4-in. by 8.2-lb. Z-bars welded in place on each side of the center of the car. The two end floor slope sheets are similarly stiffened.

There are six outside and six inside longitudinal hopper sheets. The former extend downward from the side sheets, sloping inward to the discharge gates and between the floor slope sheets. They are welded in place. The latter are also welded on from the longitudinal hoods to the discharge gates and between the floor slope sheets. The three longitudinal hoods are welded to the floor slope

sheets and the center sills. Completing the hopper construction are 3-in. by 3-in. angles connected to the ¼-in. pressed center sill and hopper ties extending across the car at the front and rear of the hoppers, thus forming a continuous support around the hoppers. Further reinforcement is by a ¼-in. pressed flanged stiffener between the inside hopper sheets. These are secured by welding.

The discharge gates, six per car, are of the sliding-gate type, manually operated, for full or partial opening.

The side plates, two per car, are 3-in. by 5.1 lb. Z-bars with a 1¾-in. by 1¾-in. sub-side-plate angle. Twenty intermediate side stakes are ¼-in. pressed plate and four at the bolster are ⅜-in. plates. All are welded to the side sheets where these are in contact with the lading. The side sheets are No. 7 U. S. S. gauge open-hearth steel, and are butt welded to each other.

The corner posts, end posts, and hand-brake posts are 3½-in. angles. End plates are 3-in. by 3-in. angles.

The roof, hatches, and connections are waterproof. The ten hatches are of No. 7 U. S. S. gauge and the covers of No. 11 gauge open-hearth steel. The hatch door-locking bars are operated from the longitudinal running board. The hatches in the end compartments are operated by one handle for each two doors on the same side of the running board. The two center hatches are each operated by a separate handle. Grab handles facilitate entry into the three compartments.

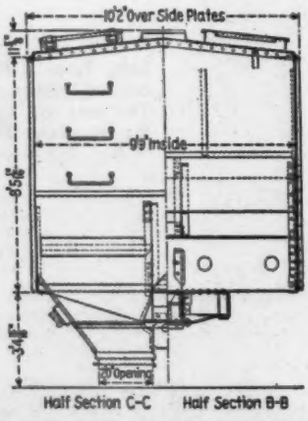
The trucks have a nominal capacity of 70 tons. The one-wear rolled-steel wheels are 33-in. in diameter and mounted on 6-in. by 11-in. journals. The side frames are the A. S. F. A-3 Ride Control, spring-plankless, integral-box type and have 3 1/16-in. spring travel.

Principal Weights and Dimensions

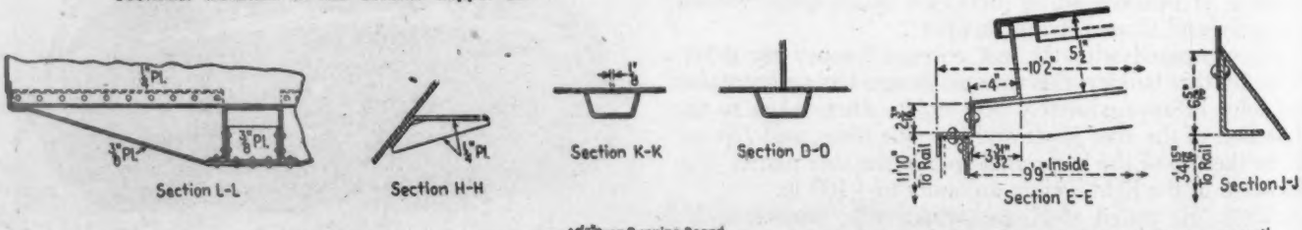
Length over strikers, ft.-in.	45'-10"
Length inside of body, ft.-in.	39'-10"
Width over side plate, ft.-in.	10'-2"
Width inside, ft.-in.	9'-9"
Height rail to top of running board, ft.-in.	12'-9 5/8"
Height rail to bottom of discharge outlet, ft.-in.	0'-9"
Distance center to center of trucks, ft.-in.	35'-10"
Truck wheel base, ft.-in.	5'-8"
Nominal capacity, lb.	140,000
Capacity loaded to eaves, cu. ft.	2,840

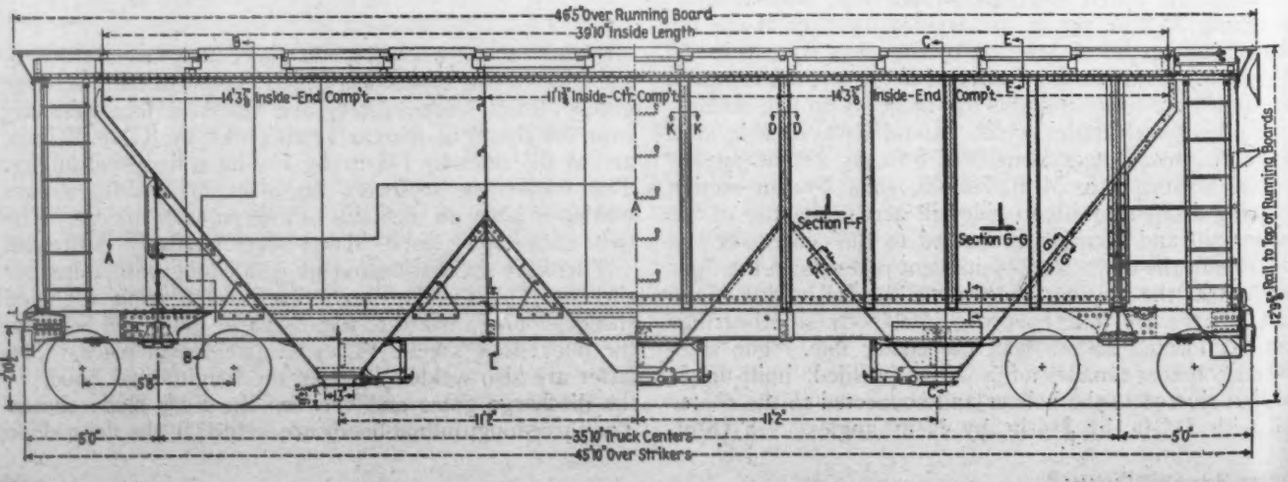


Interior view of the hoppers



Above: Half sections across the car—Below: Sectional elevation of the covered hopper car





EDITORIALS

All-Welded Boilers

The fabrication of locomotive boilers by welding has progressed beyond the experimental stage to a point where the outlook is bright that welding will become as widely accepted as riveting for all boiler construction. It has not reached this position without difficulties. For years its progress was retarded by the poor welding practices that existed on many railroads. More recently it has been slowed by the cautious approach to its acceptance demanded by those whose memory of the faulty welding and misapplications of good welding in the early years has not been offset completely by the rapid advances made in the art of welding during the past decade.

This reluctance has been overcome to a great extent by a combination of factors, not the least of which has been the 100 per cent performance of the first all-welded locomotive boiler during the nine years that have elapsed since it was built. Other factors have been the development of procedures and equipment that can assure the production of welds to the high standard required for locomotive boilers. An indication of the extent of this development is given in the description elsewhere in this issue of the techniques and facilities employed by the American Locomotive Company at its Schenectady plant. It reflects as well the confidence that one locomotive builder has in the future of welding for the fabrication of boilers, a confidence that is held by many others, particularly by welding engineers who know by experience both the possibilities and limitations of welding.

The equipment installed at the Schenectady plant, while extensive, is not as complete as could be justified by a greater volume of orders for this type of boiler. It represents an outlay, however, that would make its installation by a railroad uneconomical except for some of the larger systems that could possibly absorb its cost in the building of a sufficient number of boiler units. The requirement for a stress-relieving furnace is in itsellf a sufficient reason to place the construction of all-welded boilers beyond the possibilities of most railroads. Also, the operators must be trained to meet the high welding standards required for locomotive boilers and qualified by passing welding tests graded by the impersonal instruments of the testing laboratory. All of these conditions so essential to good boiler welding emphasize the value of careful planning and experience for this exacting work.

More important than the valuable equipment, however, are the capabilities of the welding operators and the quality of the welding procedure established for the use of the equipment. The care and top-notch workmanship going into these all-welded boilers should be reflected by their duplicating the performance of the first all-welded boiler. Together with the inherent advantages of welding for boiler fabrication, perfect performance records should dispel all doubt about the ability of welding to improve one of the weakest competitive parts of the steam locomotive—the boiler.

What Is Light Worth?

It was not so long ago when an electrical engineer's suggestion that night lighting in a railroad terminal be improved, received the following response from the chief operating officer, "I don't want illumination, just give me a little light". The men who learned to work with an oil torch have done good work, and have turned in a remarkable safety record, although for many years railroad shops, offices, yards and cars offered many particularly bad examples of artificial lighting. In justice to the railroads, it should be said that railroad facilities offer more difficult problems to the lighting engineer than does almost any other application. Now, with the development of new light sources, railroads are beginning to show the way with light.

The first conspicuously good examples appeared in railroad cars. Although the long, low car interiors present especially difficult glare problems, and power supply is limited, railroad passenger-car lighting as applied to some of the "streamliners" has been cited as an example of how people should light their homes.

A typical passenger reaction is that of a woman in the Northwestern station in Chicago. When asked if she didn't think the new trains were nice, she replied, "Yes, now I can get home in less than five hours,—it used to take me nine hours on the old dark cars". That kind of reaction is difficult to measure in dollars and cents, but it does represent value.

More specific values attributable to good lighting were contained in the 1945 report of the Committee on Illumination, Electrical Section, Engineering Division, A.A.R. This report refers to a shop in which lighting values were increased from a rather spotty 3 to 5 footcandles, to a well-distributed 20 footcandles. The first six months' operation with the improved light, as compared with the six months previous, showed an increase of 10 per cent in locomotive output, an 80 per cent decrease in rejection by inspectors, a 43 per cent decrease in reportable accidents, and a 41 per cent decrease in non-reportable accidents. These

improvements may not all have been due to better lighting, but they are substantiated by the results of extended tests made on the New York City Transit System to show the effect of improved lighting on subway platforms. These were reported in 1943 by E. E. Dorting, supervisor of lighting, New York City Transit System, and showed that the lighting effected a reduction of 52 per cent in accidents to passengers.

Several means of obtaining good lighting for railroad applications are described in this issue in an article "Shop and Office Lighting". In the shop applications shown, lighting intensities were increased about five times and the reflection factor of the floor greatly improved by the use of powdered lime. A car shop application which employs the same fluorescent units for the space between cars and the interiors of the cars is ingenious and effective since it supplies good light with no dependence on the car-lighting system and no need for supplying interior portables. The fluorescent office lighting shown has the hearty endorsement of the office workers and provides a great improvement both in quantity and quality of light with no increase in power consumption.

With installations such as these, the railroads are becoming leaders instead of followers in the lighting field and it seems certain that, as materials become available, many railroads will take advantage of the opportunities offered to better their safety record and improve working conditions. It is difficult to precalculate the value of lighting, but an adequate lighting system almost always pays out.

Crane Boom— Which Direction?

At the March meeting of the Northwest Carmen's Association in St. Paul, Minn., the subject of commodity loading on open-top cars was presented by L. T. Donovan, A. A. R. loading rules inspector, Pittsburgh, Pa., and a question raised why three of the figures illustrating A. A. R.-approved methods of crane loading carry the notation that the boom end of the crane must trail, whereas other figures on the same subject do not have this notation.

After taking the matter up with the A. A. R. committee, Mr. Donovan explained that the requirement for a trailing boom end applies only to machines traveling on their own wheels, such as those shown in Figs. 157, 158 and 159 of the loading rules book. This requirement was placed in the loading rules as a safeguard against derailment since the light end of a crane (the boom end) has a tendency to rise when the coupler slack is bunched or stretched; this lifting action being more pronounced when the light end of the machine is leading. In a number of cases, the lifting action has been sufficient to raise the front truck off the rails, and in order to minimize the hazard involved in the handling of such units, it was felt that forewarning was advisable, hence the requirement: "Boom end of crane must trail" was included in the rules.

When machines are not traveling on their own wheels, it is obvious that they should be secured to cars in a manner that will insure their safe handling, regardless of the direction in which the machines are being transported. Hence the requirement: "Boom end of crane must trail" is not included in specifications covering machines loaded in accordance with Fig. 153 to 156-A incl.

The rules make a further distinction between machines on which the boom is attached and those from which the boom has been removed. In the latter case, a further requirement is included in the rules to "remove key or nut from center pin of trailing truck". This additional safety measure has been provided in order to avoid lifting the truck off the rail even if the body of the machine should rise.

Do Your Men Know What's Going On?

Within the past two months two things have happened in the railroad industry that will have an influence on their ability to maintain their position as profitable private enterprise for many months to come. These events are the increase in wages and the increase in the cost of coal. Regardless of the fact that the roads will, no doubt, be granted compensatory increases in rates there are many, in the railroad industry itself, who feel that such prospective increases in rates may react unfavorably in the competitive battle which the roads must wage with other forms of transportation to maintain their position.

It so happens that the only alternative to charging the customer more for the product you sell him or the service that you may render him is so to reduce the cost of producing that product or service as to maintain your ability to operate at a profit in spite of higher costs.

Of all the account items that go to make up the several billion dollars of operating expenses each year the cost of locomotive repairs and fuel stand at the top of the list. To some extent—at least in so far as locomotive condition is concerned—these two expense items are related. To this extent the control of maintenance costs—and fuel costs—is a responsibility of, and within the jurisdiction of, the mechanical officers and supervising staff of our railroads.

In spite of the important place which the Diesel-electric locomotive has assumed in the operation of trains, the more than 40,000 steam locomotives in service in this country still present the major problem as far as locomotive operating cost is concerned and, at the same time, offer a major opportunity to effect economies in the expense of hauling trains. Unfortunately, a very large part of the steam locomotive inventory of our railroads is not only over 25 years of age but, as

compared with really modern steam power, is definitely obsolete. The advancing age, and the relative unfitness for service in present-day high-speed main-line traffic of these obsolete locomotives, not only affects adversely the efficiency of railroad operation but places upon the roads a burden of unnecessary expense.

It is not the purpose here to go into the details of how the mechanical men of this country can and must contribute to a substantial reduction of locomotive operating cost. It is our purpose merely to draw attention, once again, to the fact that this problem is of such magnitude and complexity that it is going to require the best thinking on the part of every mechanical man from the chief officer to the mechanic in the shop and enginehouse in order to find the ways and means to accomplish the hoped-for result. Only by the acquisition of the most advanced knowledge of the manner in which the new facilities and methods developed during the war years may be used to improve shop and enginehouse operations and only by the dissemination of that knowledge to the far corners of the railroad industry can this job be done.

In September, at the Hotel Sherman in Chicago, the coordinated mechanical associations—Railway Fuel and Traveling Engineers, Boilermakers, Car Department Officers, and the Locomotive Maintenance Officers—will again hold their joint meetings, with an exhibit of the products of the many manufacturers that supply equipment for modern locomotive operating and maintenance. These meetings, with their technical reports from committees that have been searching out the best methods and improved devices for the past 10 months, will afford an opportunity for over two thousand railroad and supply men to sit down once again and talk face to face about this problem of reducing expenses.

No progressive mechanical or operating officer can afford not to have representatives from his road at these meetings. It has been obvious to those who come in contact with the railroad industry, by way of travel in the conduct of business, that the confinement since 1940—and the concentration on the job of helping to run his individual railroad—of railroad mechanical men to their own roads has caused them to be out of touch with the many details of helpful practices that comes through the opportunity to observe what others are doing and to engage in a personal discussion of mutual problems.

This also might be an appropriate time and place to make the observation that, in the thinking of many mechanical officers, the responsibility for discovering ways to improve methods and reduce costs rests solely with those at the top and that if the staff supervisor in shop and enginehouse wants to broaden the scope of his knowledge or improve his ability to contribute to better railroad operation he should do it on his own time and at his own expense. That our associations have been built, in large part, by men who have done just this is a tribute to the loyalty and interest of mechanical-department supervisors. However, this attitude no longer has any place in modern industrial management—if management expects those who have been entrusted with administrative and supervisory positions to put forth that extra personal interest and effort that results in improved operation and reduced costs it should expect to pay for it, or not get it.

The End—Or The Means?

In any operation of such complexity and covering so vast a scope of engineering and operating details as a railroad it is, of course, necessary that there be rules and that the rules be rigidly adhered to in the interest of efficient functioning. Because railroads, through the interchange of equipment, whether they be in the east or the west; the north or the south, must operate with consistency and with a degree of standardization *of results,* agencies have been set up to coordinate the procedure which should be followed to bring about desired results. So far, however, except in the matter of certain items of design in rolling stock and motive power, the control over design by central agencies has been definitely limited. Because this has been true, progress has been rapid and, in most matters, the initiation and development of new ideas has been unhampered.

There is always the chance, though, that an agency, or a group therein, may have given such exhaustive study to a phase of railroad operation that they may have a justifiable reason for feeling that within their possession there is information of such comprehensive nature that a set of rules governing methods of procedure can be formulated and made mandatory and that the agency can then act merely to enforce the rules and enforce them arbitrarily.

A case which recently came to our attention serves as an excellent example of the danger of establishing rules which act to control the means of accomplishing a result instead of setting up carefully defined standards for a desired result and insisting that those standards be met—by whatever means. So much difficulty has been encountered on many railroads in obtaining a satisfactory quality of wheel-and-axle work that the Wheel and Axle Manual has been continually and carefully studied—and frequently revised—with the idea of setting a high standard of quality in this kind of work. The Manual has offered to the railroads, as a result of the wide experience of the committee under whose supervision it was prepared, certain recommendations as to tools and methods by the use of which the high quality standard can be met. When, however, the Rules of Interchange make mandatory the use of these tools and methods, one very important fact has been overlooked. Progress in machine and tool design is so rapid these days that some tools and some methods may be obsolete before the printer's ink is dry. The railroad industry cannot afford, at this stage, to close the door to any development that will simplify, or reduce the cost, of attaining a desired result. It is better to define the needs and judge the results than to specify the means of attaining them.

With the Car Foremen and Inspectors



C. & N. W. Wolf Road repair yard after installation of concrete roadways and automotive equipment

Roadways Concreted at

Proviso Repair Track

THE Chicago & North Western car repair yard at Proviso (Wolf Road), Ill., just west of Chicago, was greatly improved in 1945 by the provision of wide, well-drained concrete roadways and modern material-handling equipment of the automotive type, operating on rubber-tired wheels and delivering car-repair materials and supplies much more quickly and economically than was previously possible. This improvement has now been in service over 10 months and is largely credited with a 25 per cent increase in output of repaired cars with the same force, to say nothing of reduced automotive maintenance cost, both labor and material, due to operating on pneumatic tires and with less tractive force required on smooth pavements.

Material delivery is one of the primary factors in the time and cost of repairing freight cars and the speed with which this work is now done at Proviso is illustrated by the following specific example: When pressed for a large output of repaired cars, it was formerly the practice to employ a small material delivery force on the third shift so that all necessary repair materials could be placed and made available at individual car locations when the day force started work in the morning. The speed and flexibility of rubber-tired automotive equipment operating on the new concrete roadways is such that this third shift crew is no longer needed. Materials and supplies are now delivered so promptly in the morning that everything necessary is on hand by the time checkers get through marking up cars and the cars are jacked. This rapid service which involves a minimum of manual labor is, of course, also continued throughout the day.

The Wolf Road repair yard, when placed in operation in October, 1927, had a total capacity to hold 520 cars and was and still is the largest car-repair point on the North Western system. The purpose of the yard is to repair freight cars, both system and foreign, loaded and empty, enroute to connecting lines and for movement over the C. & N. W. which operates the largest freight house and transportation yards in the country at Proviso, Ill. The Wolf Road repair tracks handle all classes of repairs, light, medium and heavy, and are strategically located to do this work with a minimum of switching to and from the transportation



The wide center roadway with material rack, painter's scaffold and other tools and supplies conveniently available to the repair track on each side

yards. A nominal force of about 250 men is now employed and the average output is 125 cars a day.

Repair Track Layout

Car repair tracks at the Wolf Road yard extend in an east-west direction and were laid out with six tracks, Nos. 1 to 6, inclusive, south of the long line of shop buildings and seven tracks, Nos. 7 to 13, inclusive, north of the buildings. These tracks average about 2,000 ft. in length and are divided at approximately the center by the Wolf Road overhead viaduct.

There are two shop buildings east of the viaduct. One houses a blacksmith shop, machine shop, triple-valve repair shop, tool box and locker room, assistant foreman's office and paint shop; the other, an oil storage room and facilities for handling renovated journal box packing.

There are two shop buildings west of the viaduct. one contains the main locker room, boiler room, wash room, general car foreman's office, storekeeper's office and storeroom. The other building houses the woodworking equipment such as cut-off saw, rip saw, etc.

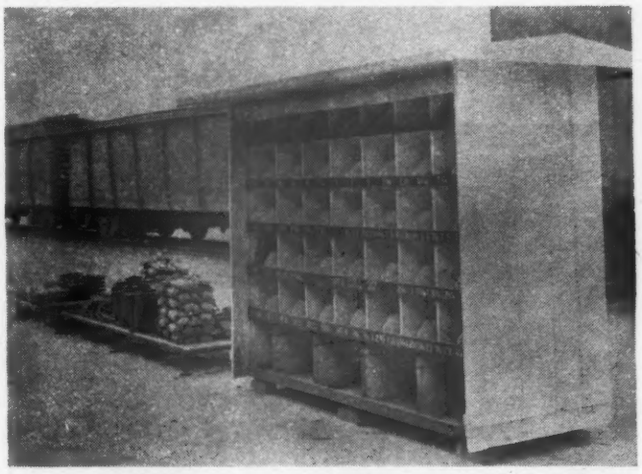
In addition to material in the storeroom, there is located at each end of the repair tracks one lumber shed, one wheel bed, one casting platform and one building for housing supplies of oxygen and acetylene tanks which greatly facilitates the delivery of material to cars undergoing repairs.

The roadways when originally constructed consisted of common fill and cinders. The motorized equipment furnished for the delivery of material at that time consisted of four Fordson tractors. Later on, to speed up the delivery of lighter material, two Model-A Ford trucks and one Indian motorcycle were furnished. Still later with the inauguration of heavy repair program work, one Case tractor and one shop mule tractor were furnished; also a Bucyrus-Erie Loadmaster with crane to handle such heavy material as bolsters, side frames, etc., and to raise metal end sheets and end gates into position on heavy repair cars.

Cinder Roadways Inadequate

Owing to the provision of only dirt and cinder roadways, it was difficult to operate machines on the repair

(*Continued on page 356*)



Bolt and nut storage units make material easily available to car repair men



Burro Model 30 15,000-lb. crane used in unloading wheels, scrap, couplers, trucks and for general utility purposes about the repair yard

Handling

Freight-Car Wheel Changes

By P. P. Barthelemy *

Part II†

Swing-Turning Mounted Wheels

Many devices of various designs are in use for swing-turning mounted wheels on the rip track. The old crutch stick was finally banned but unfortunately is not quite extinct. The crutch stick used on either the collar or on the dust guard shoulder is still fairly common, but this should also be banned, as journal abrasions occur when it inadvertently slips off. In use, these devices scratch the collar surface and bruise their edges, which tends to increase the packing rolling trouble. Some crutch sticks are used on the axle between the wheels, either near the hub or at the center, but such a device is awkward to handle and the lift is too heavy.

There are several highly practical devices used under the axle center by means of which one can easily lift and turn a heavy pair of wheels. One of the simplest and most effective is the "battle ax", illustrated. This is a light one-piece affair having an eccentric base with a long pipe handle. Another effective device consists of a base with a telescoping pillar to which a pivoted long lever handle is attached; this also engages the axle at the center. There are others, all showing a marked degree of ingenuity in their development. With a reasonable storage-track layout, the use of turning devices may be dispensed with in whole or in part.

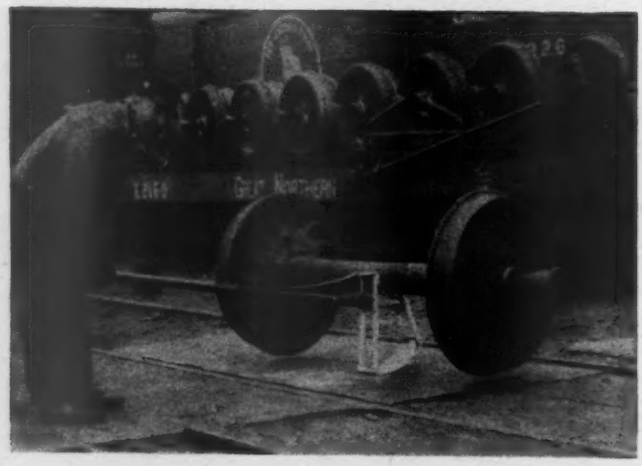
Where wheels are customarily rolled to the car, the use of a dolly to slide the old wheel out and the new one in is about the easiest and quickest way and requires the least space. Various kinds of these are in use; a light and efficient one, illustrated, consists of 1¼-in. pipe tied together to a 10-in. gauge. For convenience the dolly track is made in sections with male and female connections. The two four-wheel dollies are equipped with small brake-chain sheaves wheels, bored out for roller bearings to fit the short axles. Light wedges are used to run the wheels up on the dolly.

For dismantling and reassembling trucks, the use of a lightweight, easily transported trestle saves a lot of time and back-breaking lifting. The frame in made of extra heavy 1¼ in. pipe, all welded, and is equipped with Yale, Coffin, or similar light ratchet hoists. The manner of use is readily apparent. For easy transportation about the rip track, one end is carried on a pair of light high wheels mounted on a light axle in open brackets on the trestle legs. At the other end of the trestle, short drop handles permit the trestle to be trundled like a wheelbarrow by one man.

Another convenient device for handling truck parts at the car consists of a lightweight welded-steel boom, applied with a pin through the coupler knuckle hole and equipped with a small chain hoist at the upper end. as shown in one of the illustrations.

For the removal and application of journal-box nuts a geared power wrench is a labor and bolt-saver. Too

* Recently retired master car builder, Great Northern.
† *Part I appeared in the June issue.*



The light "battle ax" device for lifting and turning mounted car wheels



Pipe track and two four-wheel dollies moving mounted wheels across the repair tracks

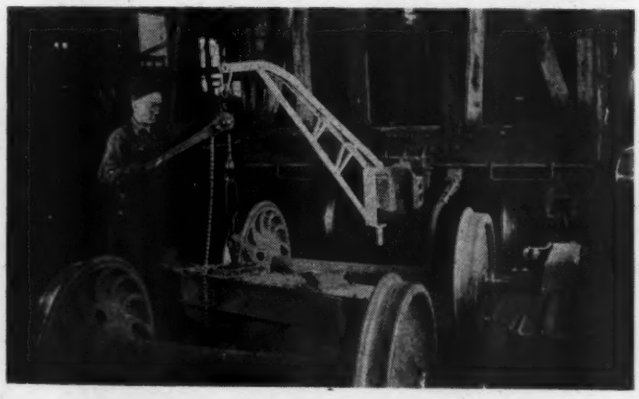
many good bolts are destroyed by torch-cutting because ordinary wrench removal of the nuts is a slow and tedious operation which may well cost more than the new bolts.

Power-Operated Jacks Essential

Modern power-operated jacks have become an economical necessity, yet they are conspicuous by their absence from too many rip tracks; they are real money-savers. In the selection of power jacks, do not go overboard on capacity, as the 50-ton is heavy enough for all ordinary work. The rare occasions when higher capacity jacks could be used do not justify the extra labor involved in their handling for ordinary operations.

Light-capacity jacks are of course regular equipment and may be pump-handle, high-speed, or the latest hydraulic types. The short journal jack is also a regular tool and may be high-speed or hydraulic. Slow jacks of any type are luxuries that we cannot afford to have on our repair tracks.

For transporting heavy jacks about the rip track a Chore Boy type of light and fast tractor is a money-saver, and it can be used for many other fast transportation jobs. Light high-wheel low-platform wagons are handy in the absence of tractors. Keep the platform low in order to reduce the loading-lift to a minimum. Light hand-operated hoists mounted on these wagons and on the Chore Boy serve to eliminate heavy manual lifts.



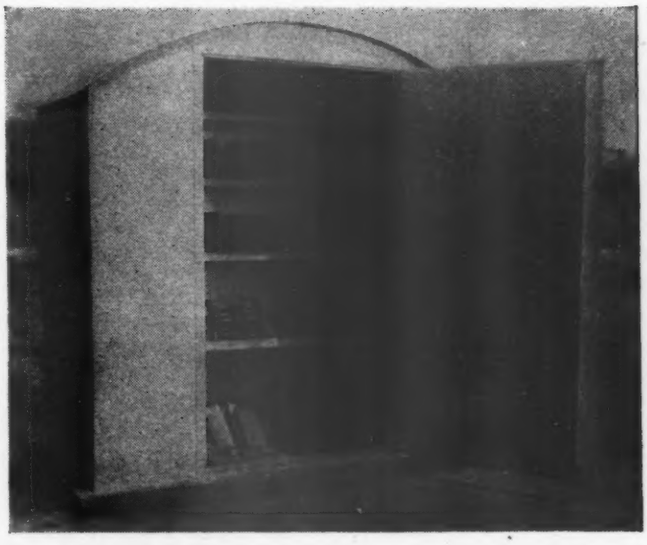
Coupler-supported hoist used in handling truck parts

A good supply of jacking blocks of the different sizes needed must be on hand. These should be tie-bolted to prevent splitting, and should be kept well and neatly painted.

Suitable trucks or trays are needed to handle incidental materials not only for wheel changing but also for the numerous other items needed in connection with car repair work. If these trucks are hand-operated, they must be as light and mobile as they can safely be made.

Since the renewal of quite a number of detail parts is always a part of wheel changing operations, ready availability of those parts will save considerable time. One of the illustrations shows a small steel fully-enclosed material cabinet, one or more of which may be placed in advantageous locations on the rip track. The shelving may be arranged to suit the types of materials carried. Orderliness is of course of primary importance.

Car trestles or horses present a problem in that they are usually much too heavy and made of wood, which is not the safest material for so important a piece of equipment. Good all-welded constructions are much safer, and lightness is important for convenience in handling and placing, particularly if they must be transported by hand. A light and strong horse may be made of extra-heavy pipe, all welded, or of other well designed welded steel construction. As a matter of safety, only new material should be used, an excellent rule to follow in the fabrication of all devices—failure of which would endanger life and limb.



Steel material cabinet placed at various points on the repair tracks

Decisions of Arbitration Cases

(The Arbitration Committee of the A. A. R. Mechanical Division is called upon to render decisions on a large number of questions and controversies which are submitted from time to time. As these matters are of interest not only to railroad officers but also to car inspectors and others, the Railway Mechanical Engineer will print abstracts of decisions as rendered.)

Clarification of Paragraph (g-1)—Rule 4

After an accident on their tracks the Terminal Railroad Association of St. Louis made repairs to tank car NATX 5922 and rendered a charge of three hours against the car owner for repairs to an end sill, the other repairs to running boards and paint being marked "No bill". The North American Car Corporation took exception to the charge for the repairs to the end sill, claiming that where the end sill is bent in unfair usage and the damage is not sufficient to warrant its removal for repairs, it should be optional with the damaging line to repair the sill on the car or permit it to go forward. It believed it is not the intent of the Interchange Rules to permit any company to divide responsibility of damage to cars under Rule 32 and especially when defects were directly related. Furthermore, the North American Car Corporation held the opinion that since the damaging line had elected to repair the end sill, it should assume the expense of the repairs. The Terminal Railroad Association of St. Louis joined in this arbitration case for the purpose of clarifying Paragraph (g-1) of Rule 4. It contended that the intent of the rules seem to be that where the end sill and associated parts could be repaired without removing the end sill from the car, the damage to the end sill is not cardable in interchange and, if not cardable in interchange, that the responsibility for repairs would rest with the car owner.

In a decision rendered November 15, 1945, the Arbi-

tration Committee said, "Although not required to be repaired by the rules, slight damage when repaired in connection with other repairs to associated cardable damages which occurred at the same time, should be assumed by the handling line. The contention of the North American Car Corporation is sustained." *Case 1815, North American Car Corporation versus Terminal Railroad Association of St. Louis.*

Wheels Reported as "Loose" without "Oil Seepage"

A pair of second-hand wheels was applied to Seaboard Air Line car 16266 by the Terminal Railroad Association of St. Louis on August 5, 1942. On August 8, 1942, the Baltimore & Ohio removed this pair of wheels and its billing repair card showed one wheel to be "loose" as the cause of removal. The B. & O. billed the Seaboard for the work and, in turn, the Seaboard requested counterbilling authority from the Terminal Railroad Association of St. Louis to offset all charges made by the B. & O. This authority was refused by the Terminal Railroad Association of St. Louis because the B. & O. failed to show "oil seepage" on the billing repair card and because an investigation by the B. & O. later showed that the wheels were found not to be loose, and were reapplied on another car.

In a decision given on November 15, 1945, the Arbitration Committee said, "The proper term, as per Rules 10 and 81 was used in reporting the cause of removal. The removal of the wheels by the Baltimore & Ohio due to oil seepage, an indication of their being loose on the axle, is the responsibility of the Terminal Railroad Association of St. Louis. The contention of the Seaboard Air Line is sustained." *Case 1813, Seaboard Air Line versus Terminal Railroad Association of St. Louis.*

Roadways Concreted At Proviso Repair Track

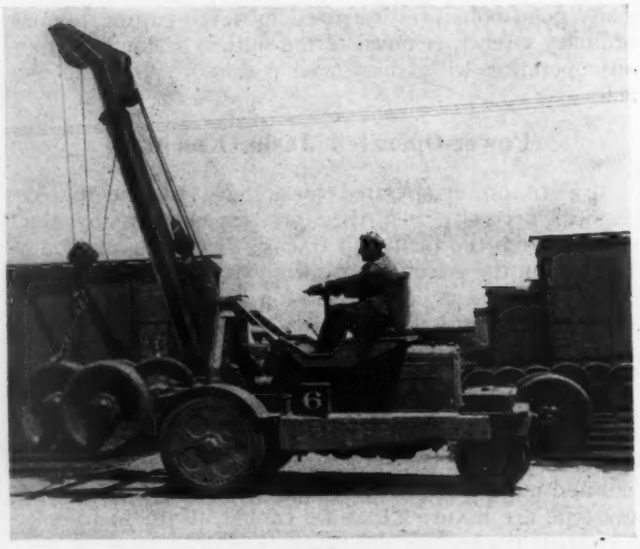
(*Continued from page 353*)

tracks during the winter months and after heavy rainfalls and particularly so during the early spring months.

On April 23, 1945, work was begun on concrete paving the northeast and northwest sections of the repair tracks and between the main buildings and Track 6 south of them. This work was completed on August 23, 1945, a total of 32,000 sq. yd. of concrete being laid. The improved drainage in connection with new paving consisted of the reconstruction of 12 old catch basins and the installation of 11 new laterals and 72 new catch basins. The concrete is 10 in. thick for a distance of 1 ft. from the track ties, the balance of concrete being 7 in. thick.

In order to have material closer to cars undergoing repairs, Track 10 at the west end and Track 9 at the east end were removed, making a space of 31 ft. 6 in. between Tracks 9 and 11 on the west end and Tracks 8 and 10 on the east end. The center of this space is used for storing material such as brake shoes, truck springs, side bearings, draft gears, etc., on metal platforms conveniently spaced. Such items as bolts, nuts, washers, etc., are also kept on these wide spaces in small houses each equipped with a canvas front which can be lowered during inclement weather and at the close of each day's work.

In line with the installation of concrete paving, all trailers, box wagons and packing containers are having



Krane-Kar equipment to handle two pairs of mounted car wheels at a time



Buda one-ton Chore Boy delivering bolts and rivets from the storeroom to various points about the car repair yard

cast-iron wheels replaced with rubber-tired wheels equipped with roller bearings; the same change is also being made on air-brake carts, packing wheel barrows and welders carts. Old-style wheel barrows with metal wheels used by laborers have been replaced with new wheel barrows equipped with wheels having pneumatic tires. The application of these rubber-tired wheels results in smoother and faster operation and saves wear and tear on the pavement.

The two Ford trucks and the Indian motorcycle will be replaced with Chore Boys. The material-carrying surface of these machines is only 20 in. above the ground which greatly facilitates the handling of such items as couplers, draft gears, brake beams, etc.

Two Fordson tractors, which have been used principally in delivering wheels to and from cars by the use of a wheel trailer capable of carrying only one pair of wheels, have been replaced with two Krane Kars equipped with 12-ft. to 18-ft. telescopic booms which are movable; one of these Krane Kars also is equipped with a wheel-carrying device capable of handling two pairs of wheels. With the use of these Krane Kars, wheels are placed on the track ready for application and the old wheels removed at the same time. This also speeds up this particular operation as heretofore

wheels carried on the trailer were left alongside of the car and had to be placed in position with man-power.

It is expected that the Wolf Road repair yard will be equipped in the near future with a large, modern wheel shop having a capacity and facilities to supply all freight-car wheels needed on the North Western lines. Proviso has been selected as the desirable location for this wheel shop because 35 per cent of the car wheels for the Chicago & North Western system are used on repair tracks at this point.

Paint Spraying Car Exteriors and Interiors

Special equipment used in paint-spraying passenger-car and locomotive-tender exteriors and passenger-car interiors and trim at the St. Louis Southwestern shops, Pine Bluff, Ark., is shown in the illustrations. The main Bink's spray booth, installed over one track in the Pine Bluff paint shop about two years ago, is 88 ft. long by 20½ ft. wide by 19½ ft. high—large enough to accommodate the longest passenger car or two locomotive tenders at one time.

Six exhaust fans, belt-driven from individual ball-bearing 3-hp. electric motors, draw air and paint fumes out of the top of the hood and discharge it through an equal number of 42-in. hooded stacks in the roof. Adequate light is supplied for either day or night operation by a double bank of 200-watt vapor-proof lights set up on each side of the booth and arranged to transmit light to the interior through square glass windows. The upper bank of lights on each side is set at an angle of 45 deg. so as to illuminate the roof and upper side walls of the car. Adjustable scaffolds inside give painters a footing at any desired level along the car sides.

The car trucks, sides and ends are usually sprayed under the booth, but the roof is brush painted outside, using a relatively heavy roof paint. Stenciling also is generally done outside the spray booth.

In order to permit the satisfactory spray painting of passenger car interiors with either closed or permanently fixed windows, a large exhaust fan is built into a shop lower window frame at one end of the spray booth and a frame-stiffened canvas bellows provided which may be clamped to the car diaphragm. With the blower operating and all windows closed and doors open, a strong current of air is drawn in at the other end of the car and discharged through the shop wall. This enables painters to work in the car interior under greatly improved atmospheric conditions.

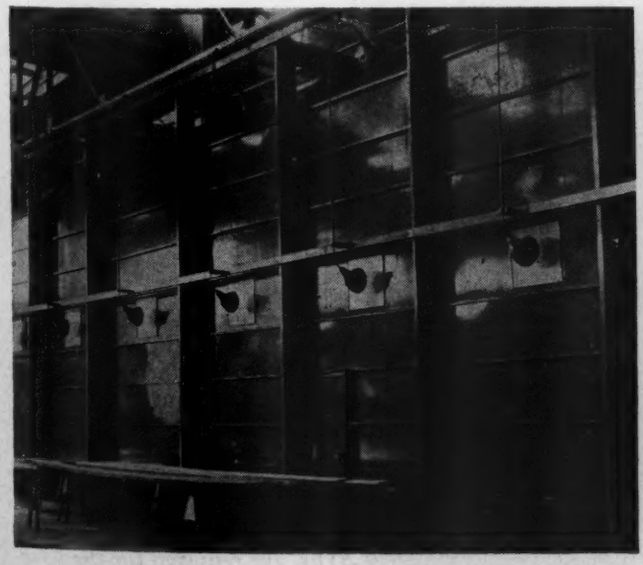


Wall-type spray booth with paper-masked work table and revolving top used in painting car interior trim and small parts

Another simple but effective painting "wrinkle," successfully used at the Pine Bluff shops, is shown in another illustration. In accordance with more or less standard practice, a small spray booth, in this instance 8 ft. wide by 6½ ft. high with a working depth of 6 ft. and an exhaust fan and air-duct connection to the roof, is used for spray painting the many hundreds of small parts which make up passenger-car interior trim and fittings, sash, doors, etc.

To support these parts under the spray hood, a small work table with a 33-in. circular, ball-bearing, revolving top is installed, and a push with one hand revolves the work through all angles in one plane, so the paint spray may easily reach all sides.

Instead of allowing sprayed paint which misses the work from accumulating on the work table and revolving top and requiring considerable subsequent effort to remove, both the table and revolving top are masked with a heavy paper which catches the paint and may be stripped off and renewed whenever necessary.





Binks spray booth installed at Pine Bluff shops for painting passenger cars and locomotive tenders

Marshall Shops Make

Nickel-Steel Driving Rods



In the rod department at Marshall shops, Texas & Pacific

Close control of forging and heat-treating temperatures and rates of heating are essential—Tool marks are removed from the finished rods by polishing

Low-carbon nickel-steel locomotive driving rods have been successfully manufactured for a number of years at the Texas & Pacific shops, Marshall, Tex., using the general procedure and special equipment described in this article. Since 1938, about 890 rods have been made and in 1945 the output was 42 rods. All 2-10-4 type locomotives, reconstructed for high-speed service, are now equipped.

The nickel steel is received at the shop in the form of rectangular billets for all side rods and main rod extensions for the modified locomotives, the main-rod billets being 24 in. wide by 13½ in. thick for a length of 32 in. and then reduced to a 16-in. by 7-in. section for a length of 49 in., for greater ease in forging the smaller front end of the rod. The chemical analysis of this nickel steel is carbon .32, nickel 2.85, manganese .80, silicon .26, phosphorus .036, and sulphur .034.

General Procedure

Preliminary to forging, the nickel-steel billets are transferred from storage to the blacksmith shop at least one day before they are to be charged into the furnace which is gas fired and provided with full automatic temperature control and recording equipment. The billets are placed in the vicinity of the furnace so as to warm up gradually, care being taken to see that the blast from the furnace door does not strike them.

Under no circumstances is a cold billet charged into a hot furnace. After the billets have had the chill removed as mentioned, they are charged into a comparatively cold furnace. Approximately 20 hr. are required for the four-door forging furnace to cool down sufficiently to charge

a billet without danger of causing internal cracks. The billet is placed in the furnace so that the outside end is at least 2 in. from the front wall of the furnace to insure uniform heating throughout. Several bricks are placed under each billet to raise it from contact with the furnace hearth and insure uniform heating.

The rate of heating the steel is about one hour for each inch of thickness. In the case of a billet 6 in. thick, it is not heated up to the forging temperature in less than 6 hr. and a billet 13 in. thick requires at least 13 hr. If this rate of heating is exceeded for nickel steel, there is a grave possibility that internal ruptures will be formed, which cannot be detected by ordinary means and which may result in failure of the rod.

At the start of the heating operation, great care is exercised in heating the billet slowly at first, and then gradually increasing the temperature until the recommended temperature range for forging, namely, 2,050 to 2,150 deg. F., is attained in the prescribed number of hours. If the steel temperature is below the minimum specified, it will be hard to forge, whereas, if is it above the maximum there is danger of overheating or possibly actually burning the steel. The billets remain within this temperature range of 2,050 to 2,150 deg. F. for approximately 45 to 60 min. before removal from the furnace for forging to insure uniform heating throughout.

Forging Operation

The proper rate of reduction for nickel steel of this type by forging is similar to any other steel of the same general type, in that no special precautions need be observed. Wherever possible the entire rod forging is placed inside of the forging furnace when bringing up to the desired temperature. A 6,000-lb. steam hammer is used and a Leeds & Northrup optical pyrometer permits easily checking the temperature of the billet while being forged to make sure it does not cool below specified minimum limits. This use of the L. & N. optical pyrometer is shown in one of the illustrations.

The steel may be forged until the temperature has fallen to 1,500 deg. F. when it must be placed back in the heating furnace and reheated to within the range of 2,050 to 2,150 deg. F., when forging may again be resumed. No forging should be done below 1,500 deg. F.

A prolongation for test purposes approximately 7 in. long is forged on only one end of 50 per cent of the small rods and on each main rod. This prolong is the same thickness as the head of the rod and the width varies from 7 in. for side rods to 10 in. for main rods. The prolong is necked with a cutter to within approximately an inch of being detached from the rod in the case of all rods. The heat number and a serial number are steel stenciled on each prolong, care being exercised to avoid inaccuracies when billets of different manufacturers are being worked at the same time. Both the blacksmith and machine foremen keep records of these numbers and a single serial number on the finished rod fully identifies it while in service.

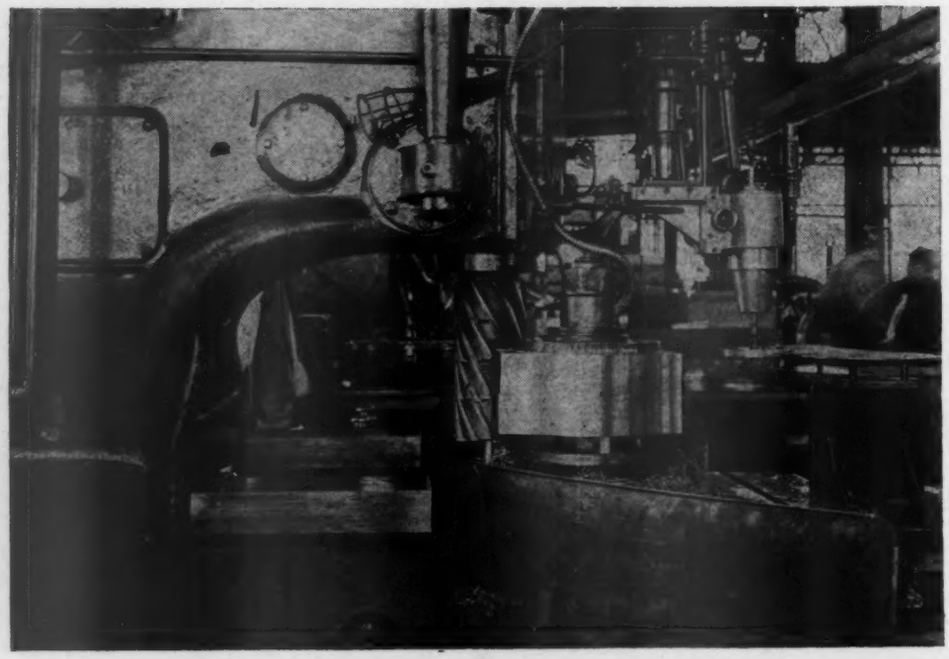
The usual procedure is followed in drawing out and forming rods under the big steam hammer. When forging main rods, due to the fact that only approximately half the rod can be forged at a time, the rod must be



Placing a side-rod forging in the lime pit for slow cooling



All locomotive driving rods are profiled on the Oxygraph



The vertical mill is equipped with a Turchan follower for machining rod ends



Heat-treating furnace with automatic temperature control and full pyrometer equipment

slowly cooled after one end has been completed. The unforged end is then placed in the furnace and again heated gradually.

Slow Cooling—Flame Cutting

After the final forging work has been completed, rods are transferred immediately to the sheet-steel lime pit, which is 72 in. wide by 36 in. deep by 12 ft. long and has a capacity to hold 62 barrels of lime. In this pit, the rods are covered with lime to retard the cooling. The rods are not removed from the lime until they have cooled to approximately 40 deg. F. which requires approximately 30 hr. The slow cooling of nickel steel is of prime importance and these instructions are strictly adhered to at all times.

Previous to heat treatment, the rods are profiled all over, the eyes are cut out and in the case of main rods, the back ends are slotted on the Oxygraph machine illustrated, leaving a minimum of ½ in. of stock on all flame-cut surfaces. In this operation, the rod ends are gradually and uniformly heated to 1,100 deg. F. and the rods moved quickly to the Oxygraph machine where the eyes are cut out before the rods cool to a minimum allowable temperature of 900 deg. F. The forging heat may be used for this purpose as long as proper temperatures are maintained. Immediately after flame cutting, the forgings are cooled slowly in the lime pit as has already been described.

Heat Treatment

The large car-bottom furnace, shown in one of the illustrations, is used in heat treating nickel steel rods and many other parts at Marshall shops. This furnace also is gas fired and equipped for automatic temperature control. Eight 6-ft. pyrometer extension rods are inserted through suitable openings in the furnace side and these reach to within ½ in. of the rod forging while it is being heated.

The quenching tank, also illustrated with a large main rod ready to be lowered into it, is 6 ft. wide by 6 ft. deep by 18 ft. long and has a capacity of 15,000 gal. of quenching oil. This oil is circulated through 85 ft. of cooling

pipe in a rectangular water tank outside the shop building in order to keep the quenching oil within desired temperature limits. The hot oil, drawn off the top of the quenching tank is pumped through the cooling system and back into 3-in. pipes around the side near the bottom of the tank, which are perforated with ⅛-in. holes spaced 6 in. apart and located so that cool oil is directed under pressure against the rods which are usually lowered to within about 24 in. of the bottom of the tank.

The quenching tank and lime pit are served by a monorail hoist with connections to the furnaces, steam hammer and Oxygraph cutting machine. Small side rods are suported in a special cradle while being oil quenched. Not more than four side rods are handled at a time and they are placed on edge in the cradle while being heated in the furnace and also while being oil quenched. The rod webs are supported to prevent warping and the rods held approximately horizontal in the cradle. Large main rods are oil quenched one at a time, as illustrated.

In heating, the rods are charged into a cold furnace and the temperature brought up to 1,400 deg. F. in not less than four hours and held at this temperature for four hours. When heat-treating main rods, at least five hours are allowed in reaching 1,420 deg. F. and the rods are held at least five hours at this temperature. The rods are then removed from the furnace as quickly as possible and immersed in the quenching oil and swung back and forth through the oil. They remain in the oil until the temperature of the rods is between 600 and 800 deg. F. They are not allowed to remain in the oil too long, until the temperature has fallen below 600 deg. F., nor are they permitted to stand in the air after quenching, but are immediately charged back into the furnace. Any deviation from this procedure may form internal cracks due to the high stresses set up in quenching.

When rods are removed from the furnace for quenching, the fires are cut off and furnace doors opened to allow the furnace to cool down to approximately the temperature of the rods after they are quenched or around 600 deg. to 800 deg. F. To secure uniform results, the temperature of the oil before quenching is between 80 deg. F. and 150 deg. F. The oil-circulating pump is operated when necessary to maintain these temperatures.

When they are put back for tempering the temperature of the furnace is brought up to between 1,100 deg. F. and 1,250 deg. F. in not less than four hours and held four hours in the case of small rods, and five hours up to temperature and held five hours for main rods. The tempering temperature depends on the chemical composition of the steel and may vary for different heats of steel. The rods are supported during tempering in the same manner as when quenching. Afterwards they are cooled in still air in a dry place.

Testing

After completion of the heat treatment, a report is furnished promptly to the mechanical engineer's office at Marshall showing the treatment given. A tensile test specimen is taken from the prolong on one of the rods by using a hollow drill shown in a separate illustration. The specimen, approximately 5-in. long by 1 in. diameter, is taken in a longitudinal direction parallel to the axis of forging and at a point midway between the center and the outside surface or corner in the case of a rectangular prolong.

A flat spot about 2 in. long by ⅜ in. wide is ground and polished on one side of the test specimen and located centrally between the two ends, efore the specimen is machine finished, for the Brinell hardness test. The tensile-test specimen is machined to specified dimensions and the .505 in. diameter portion polished. The finished test specimen has the serial number of rod from which it was removed steel-stenciled on both ends in ⅛ in. figures.

A relationship exists between the hardness of steel and



An optical pyrometer is used in checking the steel temperature during forging

its tensile strength. Dividing the tensile strength in lb. per sq. in. by 500 gives the approximate Brinell hardness. Thus the approximate tensile strength can be determined by merely making a Brinell hardness test on the rod or prolong. In making such a test on a forged surface, a spot approximately 2 in. in diameter is ground to a depth of at least ⅛ in. to 5/32 in. It is necessary to remove all the forging scale and decarburized layer of metal at the surface to secure an accurate result. In making a Brinell hardness test on a surface that has been rough machined prior to heat treatment, an accurate hardness can be obtained by grinding to a depth of 1/16 in. to 3/32 in. below the surface.

Rods which warp slightly during heat treatment and after having been accepted on test are heated to approximately 1,000 deg. F., but not higher than 100 deg. less than the final tempering temperature used, in not less than three or four hours. They are then straightened under the hammer and allowed to cool down in air.

Machining

Extreme care is exercised in handling nickel-steel rod forgings in order to prevent any sudden changes of temperature or unnecessary abuse such as becoming nicked or bent. Hogging cuts are avoided on the slab miller and also the vertical mill, illustrated, which is equipped with a Turchan follower attachment for quickly and accurately machining the rod ends and other curved and irregular surfaces. For rough machining, the depth of cut is not allowed to exceed 3/16 in. to ¼ in. with a fine feed which will be governed to some extent by the appearance of the machined surface. The depth of cut is reduced when necessary to prevent metal from being pulled out by the tool. The final finishing cut does not exceed 3/64 in.

After the rods have been machined, they are handled with rope slings to prevent them from being nicked or scarred. All sharp corners are rounded by draw filing or the use of a fine polishing wheel. The junctions of grease holes with bushing bores also have all edges rounded to prevent cracks from originating at these points. The entire surface, including the bore of the eyes of finished rods, is thoroughly polished with a fine buffing wheel to insure removal of all tool marks after machine work has been completed. All radii are uniformly made and strictly in accordance with specified dimensions. Care is exercised to prevent obliteration of stenciling in any way during the polishing and handling of rods.

Air Brake Questions and Answers

The 24-RL Brake Equipment for Diesel-Electric Locomotives

PARTS OF THE EQUIPMENT—LOCOMOTIVE A UNIT

450—*Q.—Name the parts of the A Unit.* A.—Air compressors, main reservoirs with a check valve between them. Safety valve in the compressor discharge pipe-DS-24 brake valve-S-40-D independent brake valve; combined equalizing and reduction limiting reservoir; second reduction reservoir; first suppression reservoir; K-2 Rotair Valve-D-24 control valve; B-3 relay valve; combined auxiliary emergency and displacement reservoir; C-diaphragm foot valve; H-24-D Relayair valve; unit volume reservoir; ⅜-in. check valve with choke; C signal valve and whistle; C-1-3-6 strainer and check valve; A-2 discharge valve; M-3 reducing valve; N-S-16 compressor governor; two aftercoolers and automatic drain valve; main reservoir cut-off valve; air filters; conductors valve; brake cylinder air gages; power control switch; No. 15 double check valve and various cut-out cocks, hose, and dummy couplings, etc.

451—*Q.—Name the parts of the Locomotive B Unit.* A.—Air compressors; main reservoirs and 1-in. check valve; safety valves, air gage; NS-16 compressor governor; aftercoolers and automatic drain valve; main reservoir cut-off valve; air filter; D-24 control valve; B-3 relay valve; combined auxiliary emergency and displacement reservoir; conductor valves; A-2 discharge valves, brake cylinders and various cut-out cocks, hose, etc.

452—*Q.—For what purpose is the 1-in. check valve located between the two main reservoirs?* A.—To prevent the loss of main reservoir pressure in case of main reservoir pipe breakage.

453—*Q.—What is the advantage of having a safety valve in the compressor discharge pipe?* A.—This valve, set to blow at 165 lb. is for the purpose of limiting the main reservoir pressure in the event of the governors allowing a higher pressure than intended.

454—*Q.— What portions does the DS-24 Brake Valve consist of?* A.—The brake valve body portion; rotary valve seat portion; service application portion; filling piece portion and pipe bracket portion.

455—*Q.—What does brake valve body portion consist of?* A.—On the brake valve portion are located the brake valve handle to control the operation of the train and locomotive brakes; the whistle for sounding an alarm when a safety control is initiated; the deadman valve combination for suppressing a safety control application; the emergency valve combination for initiating an emergency brake application when the brake valve handle is moved to emergency position and a sanding valve for sanding the rails by depressing the brake valve handle.

456—*Q.—What does the rotary valve seat portion contain?* A.—The rotary valve seat portion contains the seat for the rotary valve to connect the various ports and passages, in accordance with the brake valve handle position. To it is attached the selector cock to provide either controlled or main reservoir air supply when charging with the brake valve handle in full release position.

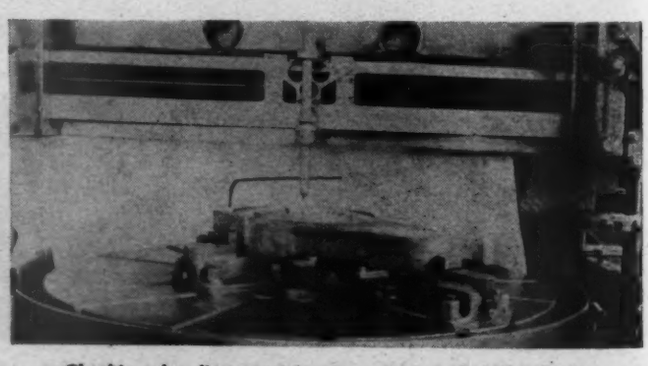
Boring Mill Table Gauge

By J. R. Phelps*

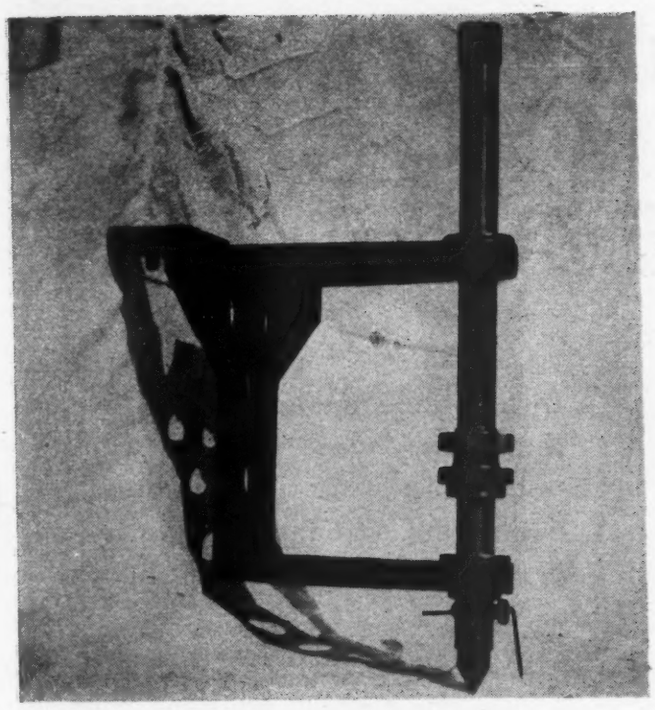
Work may be centrally located on a boring mill table by the use of a small gauge which can be home-made.

To build this gauge the distance from the face of the rail to the center of the boring mill must be accurately

* Machine shop foreman, Atchison, Topeka & Santa Fe, San Berdino, California.



Checking the alignment of an eccentric crank before boring



Gauge for centering work on the boring-mill table

determined, and this distance carefully maintained on the gauge. Two ½-in. dowel holes are drilled through the top flange. The gauge is then placed on the rail of the boring mill so that the point of the scribe-holder post is directly over the center of the table. The dowel holes are drilled about ⅝-in. deep in the rail and the dowels put in the gauge.

The gauge is ready for use in a few seconds time. It drops instantly into its proper place, and the job can be set up within 0.010 in. by the revolving needle. The boring-mill table does not have to be turned around for setting up.

Locomotive Boiler Questions and Answers

By George M. Davies

(This department is for the help of those who desire assistance on locomotive boiler problems. Inquiries should bear the name and address of the writer. Anonymous communications will not be considered. The identity of the writer, however, will not be disclosed unless special permission is given to do so. Our readers in the boiler shop are invited to submit their problems for solution.)

Flame Cutting Locomotive Parts

Q.—We are interested in mechanical flame cutting. To what extent is it being used in fabricating locomotive parts?—F. E. B.

A.—The substitution of mechanical for manual torch operation, wherever practicable, produces better workmanship and greater economy and accuracy. Flame-cutting machines have been developed which are capable of making cuts with jigsaw flexibility and of extremely high quality and accuracy. These include manual or motor-driven, partly or almost fully automatic, and portable or stationary types of various capacities. Some are equipped with two or as many as six cutting torches, centrally controlled and guided, and will flame cut a like number of identical shapes simultaneously. Machine flame-cutting is even simpler than free hand flame-cutting. Once the cutting speed and gas pressures have been set, the operation is almost automatic. As the cut progresses, the operator watches the drag and flow of slag or oxide to prevent pockets or other defects.

Mechanically operated cutting torches are rapidly being adopted for cutting various shapes out of plates and billets and are replacing forging operations in the forge shop to a considerable extent. A saving in time and material is almost always the result in these applications, as the forging and machining operations are either eliminated or greatly reduced. These machines are also used for cutting shapes out of rolled steel for fabricating parts that replace castings with a resultant saving in production costs, an increase in strength and a reduction in weight.

Various locomotive parts have been fabricated by use of flame cutting and welding. These include guide yokes, guide-yoke ends, air-pump and feed-pump brackets, generator, Valve Pilot and reverse-gear brackets, and various other brackets generally made of cast steel. It is also used to fabricate spring-rigging parts such as flat equalizers, spring hangers and various other forgings. In the boiler shop firebox plates can be cut on these machines in a small fraction of the time in which they could be shaped by any other cutting method and at a small fraction of the cost.

Relative Merits of Hot-and Cold-Formed Rivets

Q.—It is our understanding that in many instances rivet holes are being drilled 1/32 in. larger than the rivet diameter, instead of 1/16 in. larger, which has been the general practice for years. Are special rivets required in such applications?—F. Q. M.

A.—The size of rivet holes for the general run of commercial rivets is 1/32 in. larger than the rivet diameter for cold-formed rivets and 1/16 in. larger than the rivet diameter for hot-formed rivets. Hot-formed rivets can be made in all diameters from ½ in. upward. Cold-formed rivets are made in all diameters from ⅛ in. to 1 in. Standard cold-forming equipment has a length limitation of about 4 in., hence, all rivets longer than 4 inches, regardless of diameter, must be hot formed. It will be noted from the above that there is a certain range of sizes which can be made either by the hot or cold process. The determinong factor in the choice of process usually lies with the purchaser.

The first rivets used were hot formed in hand dies, and the hot-forming machine was an outgrowth of this process. Consequently, the many users of rivets adhere to hot-formed rivets because of habit. These rivets have inherent deficiencies such as scaled surface, a pinched end due to being hot sheared, fins along the shank due to manufacture in open dies, a wide variation in gauge sizes which is also due to open dies, and they require rivet holes 1/16-in. larger than the rivet. In large-size rivets which must be produced by the hot process, all of these inherent deficiencies can be corrected by further processing.

Cold-formed rivets have the advantage of being formed from bright round wire. They are usually made in solid-die machines, and have a smooth surface, a round shank, a square end, and a narrow range of gauge sizes which enable them to be driven into rivet holes 1/32-in. larger than the rivet. There is a decided trend toward the use of cold-formed rivets in all sizes up to and including ⅞-in. diameter. This type of rivet is well suited to heating in electric rivet heaters because of its superior workmanship and finish.

ELECTRICAL SECTION

Shop and Office Lighting

Installations made recently by the Pennsylvania illustrate the potentialities of new lighting equipment and incorporate ingenious methods of using light

As materials and manpower have become available, the Pennsylvania has replaced a number of depreciated and obsolete lighting systems in shops, yards, and offices. The accompanying photographs show some notable examples of good lighting for shops and offices. In many cases, illumination levels have been trebled without increasing power consumption and in others completely redesigned installations have been made taking full, and in some instances, unique advantage of the potentialities of high-intensity mercury and fluorescent light sources.

Electric Locomotive Shop

Figs. 1 and 2 show the center high-bay section of the electric locomotive shop at Wilmington, Del., before and after the present lighting system was installed. The old lighting arrangement consisted of four rows of 1,000-watt incandescent lamps in open R L M type fixtures. The mounting height was 40 ft. and the spacing between lamps 40 ft., the lamps in adjacent rows being staggered to effect even light distribution. Illumination on a horizontal plane, three feet above the floor, was four to five foot-candles.

The old lighting arrangement was replaced by one employing four rows of lighting units spaced 20 ft. apart, alternate units being respectively single incandescent and twin high-intensity mercury vapor fixtures. The lateral spacing between rows is 22 ft. and mounting height is 40 ft. The incandescent units consist of 1,000-watt lamps in high-bay porcelain enameled reflectors equipped with heat- and impact-resisting glass covers. The use of the cover greatly simplifies cleaning. To facilitate lamp renewal, the covers are hinged and secured against a felt gasket by fasteners equipped with large knurled nuts. The twin mercury lights consist of two similar units each





Above: Fig. 1—High-bay section of the Wilmington electric locomotive shop as originally lighted with incandescent units—Left: Fig. 2—The Wilmington shop as now lighted with incandescent and high intensity mercury lights.

containing a 400-watt, high-intensity mercury lamp. Average lighting intensity on the horizontal plane, three feet above the floor, is 26 footcandles.

Since the new lighting system has been installed, it has become the practice to dust the floors with hydrated lime. This serves effectively to reflect light to the under surfaces of machinery and equipment and also to improve sanitation and absorb oil. It also induces an improved policing of the shop. The lighting has materially improved working conditions and has also increased the output of the shop and reduced accidents.

Car Shop

The shop interiors shown in Figs. 3 and 4 are "before" and "after" views of the high-bay section of the multiple-unit car shop at Paoli, Pa. This section of the building includes the machine shop and tracks on which truck repairs are made. This work requires an overhead crane for removing car bodies from trucks. The old installation, shown in Fig. 3, employed two rows of 1,000-watt incandescent lamps in open R L M reflectors moutned on 40-ft. centers, 32 ft. above the floor. This produced about five to six footcandles of illumination on the 3-ft. horizontal working plane. It was displaced, as shown in Fig. 4, by three rows of the lighting units on 20-ft. centers, consisting alternately of 1,000-watt incandescent and 400-watt mercury units. These are the same type used in the electric locomotive shop except that the mercury units are single instead of twin. Average lighting intensity under service conditions is now 25 footcandles.



Another section of the Paoli car shop devoted to car cleaning and the making of repairs not requiring truck removal is shown in Figs. 5 and 6. The original lighting installation, shown in Fig. 5, was installed in 1914 and consisted of 300-watt incandescent lamps in prismatic glass reflectors mounted 40 ft. apart. This arrangement produced an average of about five footcandles illumination which varied from ten under each fixture to about one at a point midway between fixtures. Portable extension lights were used for interior cleaning and repair.

The older method of lighting has been replaced by the completely novel and extremely effective system shown in Fig. 6. This consists of pairs of 100-watt fluorescent lamps in flat porcelain enameled reflectors on 8-ft. centers mounted at a height which brings them just level with the upper edge of the car windows. With the floor dusted with hydrated lime, this provides adequate light on the sides of the car and also on the trucks. Average lighting intensity three feet above the floor is 25 footcandles, maintained. Much of the work under the car is now performed without auxiliary lighting.

Car battery capacities and charging requirements, plus the fact that car batteries may have been removed from the cars, made it necessary under the old arrangement to use light inside the cars other than that supplied by the regular car lighting fixtures. Under the new lighting arrangement an adequate amount of light is projected through the windows to the interior by the fluorescent lights. Inside the car, a lighting intensity varying from 3½ to 5 footcandles is maintained and no portables are required. A view of a car interior lighted only by the fluorescent units outside is shown in Fig. 7.

Office Lighting

One type of lighting installation which has been in service for a number of years in the general office annex at Thirty-second street, Philadelphia, Pa., is shown in Fig. 8. The light is supplied by 200-watt incandescent lamps in glassteel, porcelain-enameled reflectors which produce a rather spotty 5 to 8 footcandles on the table tops. Where manpower and material have permitted, this type of installation has been changed to that shown in Fig. 9. Each of the surface troffer type fluorescent fixtures contains two 48-in., 40-watt fluorescent lamps. The units are



Above: Fig. 3—The high-bay section of the Paoli car shop as seen under the original lighting —Right: Fig. 4—The Paoli car shop as it now appears with its new lighting system







Above, left: Fig. 5—Original system of lighting between cars in the Paoli car shop—Above, right: Fig. 6—Fluorescent units as now used between cars in the Paoli shop—Left: Fig. 7—Fluorescent lights between cars put plenty of light inside the car for cleaning and repair work

mounted on the ceiling and have openings in the sides to provide for ceiling illumination. All of the reflecting surfaces, which are of porcelain enamel, are vertical or inverted so they do not readily accumulate dust. Lamps may be removed through the side of the fixture without disturbing the louvers. The overall efficiency of the fixture when ceiling mounted is 70 per cent. When used as shown in Fig. 9, employing the same total wattage on





Right: Fig. 8—Office interior lighted by 200-watt incandescent lamps in open reflectors—Left: Fig. 9—A relighted office using fluorescent troffer type luminaires



Fig. 11—A Drafting Room in which fluorescent units produce 55 footcandles illumination on the table tops

an 11-ft. 2-in. ceiling, the illumination on the desk tops is raised to values ranging from 25 to 30 footcandles, maintained.

A similar example of lighting using the same type of fixtures, as applied to a Legal Department office, is shown



Fig. 10—A Legal Department office relighted with fluorescent units

in Fig. 10. Here, three of the fixtures are mounted in a row with a space of 5 ft. between each row of three fixtures. The lateral space between fixtures is 7 ft. 6 in. The ceiling height is 10 ft. 9 in., and the illumination on the desks is 30 to 40 footcandles. The ceilings and drop ceilings are white and the side walls a light buff. This installation requires 30 per cent less wattage than the semi-indirect incandescent installation which it replaced and produces three times as much light.

An extension of the same type of fluorescent lighting to the drafting room of a railroad tenant, shown in Fig. 11, affords an example of especially good lighting. In this application, the same type of units are mounted in rows of four, with two feet between rows endwise. Lateral spacing, on the beamed, white drop ceiling is 7 ft. 6 in., and the side walls are finished in light green. Horizontal illumination on the drafting tables is 55 footcandles. A comparison of the lighting in this room with that in an adjoining office lighted by the semi-indirect fixtures is shown in Fig. 12.



Fig. 12—View from a fluorescent-lighted office into another employing the older semi-indirect units

Double-Reduction Traction Motor*



GE-733 direct-current traction motor with double-reduction gear unit

By Lanier Greer†

Five years operating experience has established this type of drive in industrial and also light railroad switching service

By employing double-reduction gearing, a small motor can be used on small-diameter wheels and on narrow-gauge locomotives. Such a motor can be adapted to a wide range of locomotive sizes, simplifying their design. For example, weight saved in the traction motor may be used in the Diesel engine to make a more powerful locomotive without increasing the weight.

Fig. 1 shows continuous tractive force per pound of motor weight for various motors. Column A shows single-reduction motors which were being built in the period 1925 to 1930. Column B shows single-reduction motors which are being built today. Column C shows an early design of double-reduction motor which was built in 1936. Column D shows the GE-733 lightweight double-reduction motor as it is now being built and used on a wide variety of locomotives. The continuous tractive force per pound of motor weight for the various motors shown in Fig. 1 is based on the maximum reduction gearing which will give clearance under the gear case, as specified by the Interstate Commerce Commission, with the minimum wheels for which the motor is designed. This shows that steady progress has been made in the more efficient use of materials in both single-reduction and double-reduction motors.

Fig. 2 shows a graph of the continuous tractive force and motor weight for the same groups of motors that are shown in Fig. 1. For instance, the lightweight double-reduction motor weighs only one-third as much as a comparable present-day single-reduction motor and has 70 per cent as much continuous tractive force rating. To judge a motor by this chart, place a straight-edge along the abscissa and rotate it counter-clockwise toward the ordinate, using zero as the center of rotation. The better motors, so far as continuous tractive force is concerned, are nearer the ordinate.

A motor cannot be judged solely by its continuous tractive force. Consideration must alo be given to locomotive speed. If it were not necessary to consider locomotive speed as well as continuous tractive force, triple-reduction or quadruple-reduction gearing could be used. This would give much higher torque multiplication and therefore a corresponding increase in tractive force, since tractive force is motor torque translated to the rim of the locomotive wheel. The data given in Fig. 3 takes into consideration locomotive speed as well as tractive force. These have been combined to obtain a measure of horsepower. This has been done by the approximate formula:

$$HP = \frac{\text{Continuous TF}}{375} \times \frac{\text{Maximum MPH}}{3}$$

The reason for the 3 in the formula is that continuous tractive force and maximum speed never occur at the same time in a Diesel-electric locomotive. In general, the continuous tractive-force rating comes somewhere near one-third of the maximum speed. Any motor may be used with various capacity. The chart is shown in horsepower per thousand pounds of motor weight, and is shown for both single-reduction and double-reduction motors. The nomenclature of the columns in Fig. 3 is the same as that used in Fig. 1. As indicated by the height of the columns, much progress has been made in the past 20 years in the design of single-reduction motors. Also, the modern double-reduction motor shows approximately 20 per cent more horsepower per thousand pounds of motor weight than the earlier double-reduction motor, and 67 per cent as much as the modern single-reduction motor. This, together with the data shown in Figs. 2 and 3, indicates that there is a place for double-reduction motors in light-traction road service, as well as in industrial switching service, where maximum power and operating speeds are not too high. However, on the heavier high-speed road locomotives, the horsepower to be handled is so great that large-diameter armatures are necessary for commutation. These large diameters make it necessary to keep the revo-

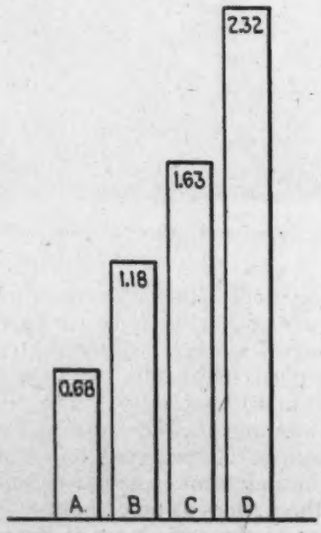


Fig. 1—Continuous tractive force per pound of motor weight

* Abstract of a paper presented at the North Eastern District meeting of the American Institute of Electrical Engineers, held in Buffalo, N. Y., April 24-26, 1946.

† Design engineer, Transportation Motor Engineering Division, General Electric Company, Erie, Pa.

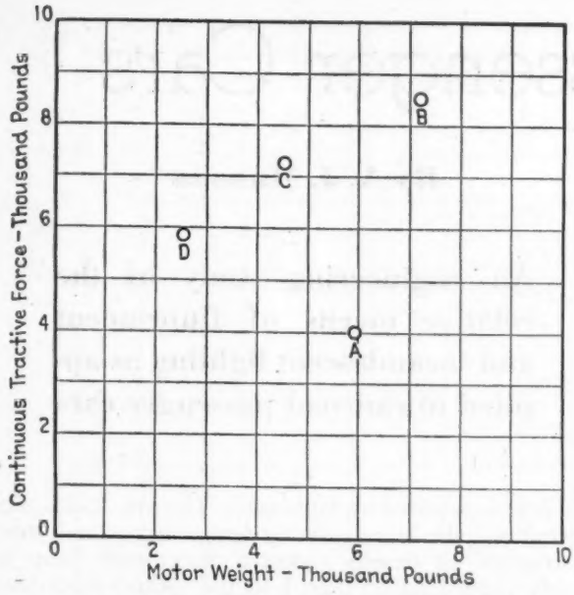


Fig. 2—Continuous tractive force and motor weight

lutions per minute low on account of the centrifugal forces involved. With low revolutions per minute there is no advantage in having double-reduction gearing, because all of the reduction needed can be built into one set.

A one-piece cast steel gear case forms a part of the motor and gear unit. The gear cover is a separate piece and is cast of malleable iron. It is bolted to the gear case along the bolting flange. All bearings and pinions are arranged so that they can be disassembled without removing the motor and gear unit from the locomotive. Also, the complete motor can be removed and still leave the gear unit mounted in the locomotive. Hardened spur gearing operating in an oil-tight gear case has a long life. Both the high-speed and low-speed pinions are straddle-mounted to maintain alignment.

The flood-lubricating system in the gear unit uses oil of about the viscosity of SAE-60 for normal operating temperatures and lighter oil for lower temperatures. This lubricates all bearings in the gear unit, the pinion end motor bearing, the sleeve axle bearings and thrust surfaces, as well as all of the gearing.

The motor is self-ventilated, which eliminates motor blowers and thus simplifies the locomotive design.

A tight, cylindrical, smooth commutator is essential to the successful operation of any high-speed d.c. machine. Commutators are seasoned after the armature is completely assembled.

The armature is designed to withstand the stresses of high-speed operation that go with double-reduction gearing. The coils are held in the core slots by wedges and the end windings are held with binding wire. The commutator end bearing is grease-lubricated.

The frame of the motor is bolted to the gear case so that the two become an integral unit, mounted as such.

High-temperature insulating materials such as asbestos cloth, asbestos paper, fiber-glass and mica are used.

Proper proportioning of copper and iron in the magnetic circuit has made it possible to materially reduce the size and weight of the field structure. The field coils have been reduced in size by the use of new insulating materials and methods.

The design constants of the motor have been made to produce a steep speed curve which, with the maximum amount of field shunting, make it possible to use the motors connected permanently in parallel. This motor connection reduces wheel slippage and gives the locomotive more pulling power.

The power of a Diesel-electric locomotive is limited to that which the Diesel engine can deliver. For this reason, it is necessary that the transmission efficiency be kept as high as is compatible with reasonable design. This is especially true on switching locomotives where small

(*Continued on page 372*)

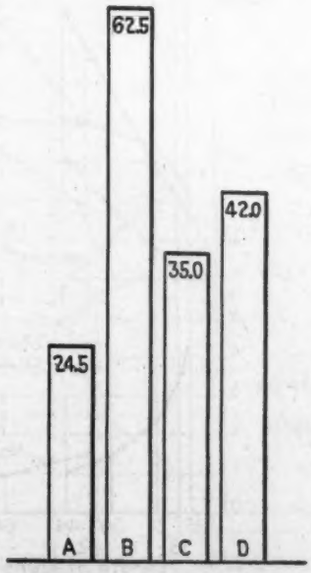


Fig. 3—Horsepower per thousand pounds of motor weight,

$$HP = \frac{\text{Cont. TF}}{375} \times \frac{\text{Max. m.p.h.}}{3}$$

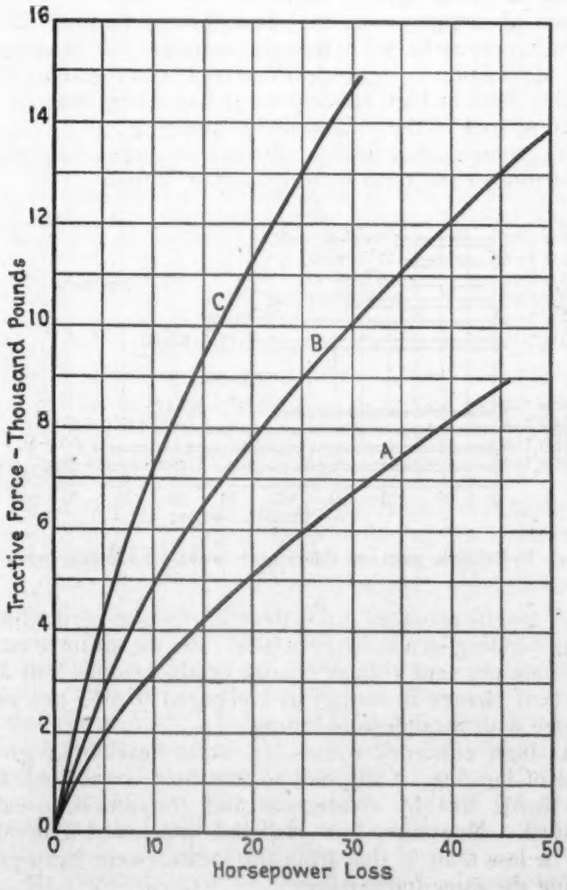


Fig. 4—Comparative motor resistance loss curves of traction motors with single-reduction and double-reduction gearing

Lighting of Passenger Cars

Part I

By A. J. Manson*

An engineering study of the relative merits of fluorescent and incandescent lighting as applied to railroad passenger cars

NEW passenger cars must have better air conditioning, better lighting than those built before the war, and must be free from dirt and smoke nuisance. This demand is going to mean a more extensive use of electric power and the application and adaptation of equipment developed for domestic uses to railroad passenger trains.

One of the improvements which will be most noticeable and which will do much to keep the public riding habit, is attractive and efficient lighting. It is true that much has been accomplished along these lines during the past ten years. The available luminous intensity at the reading plane has increased from values as low as 1 or 2 footcandles, up to 7 to 15 footcandles, and in cases even higher. Lighting engineers today are recommending intensities of 25 to 50 footcandles and more.

The illumination at the reading plane is not the sole specification for attractiveness and comfort. Any lighting arrangement or system should eliminate glare. The layout should have a pleasing appearance from either end of the car and from any position in the car. With these heavier demands of lighting load, the important items from the railroads' standpoint are: the choice of the system to obtain adequate lighting; the battery watt power requirements for operation; the cost of maintenance.

Until fairly recently, incandescent lamps were used almost exclusively. Now we have the fluorescent lamp which is being applied more and more and which has many advantages over the incandescent lamps. These advantages make it extremely suitable for passenger-car application. It produces a cool, comfortable, high quality light at high efficiency. It has a long normal life as compared to the incandescent lamp.

Its larger surfaee area results in low-surface brightness even though the total lighting output is high.

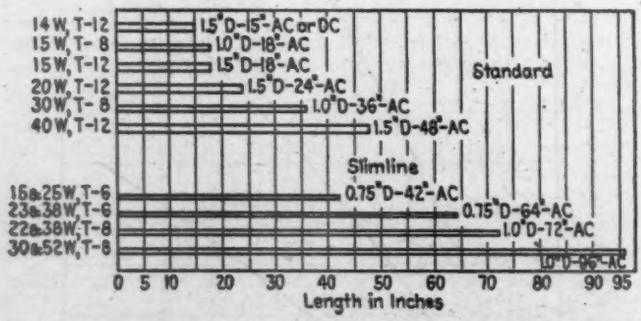


Fig. 1—Relative sizes of fluorescent lamps (3,500-deg. white)

Its length provides for better distribution of illumination, resulting in a more even level over the entire area.

A one per cent voltage change produces only 1 to 2½ per cent change in output as compared to 3½ per cent change with incandescent lamps.

Its high efficiency means less total heat for a given level of lighting. Only half of that heat is radiated, the rest being lost by conduction and convection, usually upward. Therefore, heat radiated downward generally will be less than ¼ that from the incandescent lamp producing the same footcandles.

It is little affected by vibration. The arc, itself, is unaffected and the low operating temperatures and sturdy construction of design makes a fluorescent lamp extremely rugged as compared to the incandescent lamp.

Its spectral distribution of radiation compares very closely with natural daylight.

It has a modern streamline appearance.

What are some of the characteristics of these lamps? What is the performance, power consumption, and life as compared to the incandescent lamp? Some of these desirable qualities are shown in the attached curves. To interpret these curves easily, the data pertaining to the fluorescent lamps discussed are given in Fig. 1. Figs. 2, 3 and 4 bring out some interesting details.

The fluorescent lamp is basically an a.c. lamp. Some of the various types will operate on d.c. within available

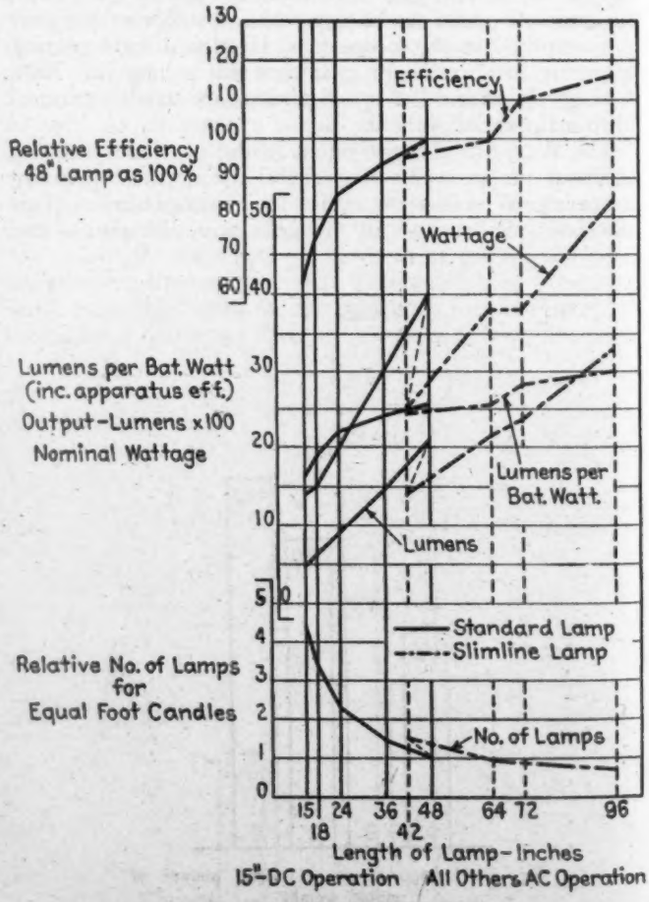


Fig. 2—Characteristics of standard fluorescent and slimline lamps showing number of lamps for equal footcandles, nominal wattage, lumens per watt and efficiency for various lengths

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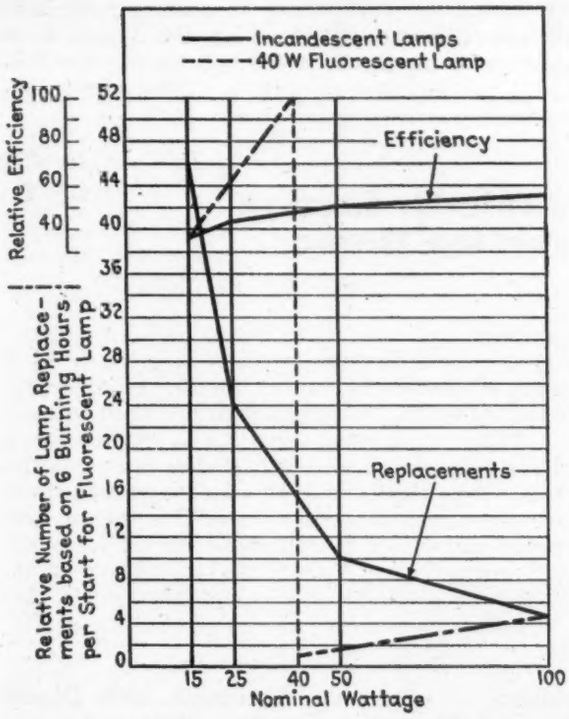


Fig. 3—Comparison of incandescent and fluorescent lamps showing relative efficency and number of replacements

railway voltage ranges. The 14-watt 15-in. lamp will operate on a line voltage of 55 to 62 volts d.c. Larger lamps require higher d.c. voltages. On the other hand, there are standard and slimline types of fluorescent lamps, all of which can be operated on 118 volts alternating current.

Referring to Fig. 2, it may be noted that the standard lamp output in lumens increases slightly more than the watt ratio. For instance, the 20-watt lamp gives a lumen output of 900, whereas, the 40-watt lamp gives a lumen output of 2,100 or 233⅓ per cent. Approximately the same ratio exists between other ratings.

The relative efficiency of the different ratings of lamps, taking the 40-watt lamp as 100 per cent, is interesting as well as the number of lamps required for equal footcandles on a given plane and which has considerable significance in the maintenance of any lighting system.

Having seen some of the most important characteristics of the fluorescent lamp, it has been most interesting to learn how such a lamp compares with the incandescent lamp which, to date, has been generally used for railway passenger-car lighting. Such a comparison is shown in Figs. 3 and 4. Assuming the efficiency of the 40-watt fluorescent lamp as 100 per cent, the relative efficiency of the incandescent lamp is low, varying from 36.4 to 56 per cent, depending on lamp wattage. The lamp output in lumens is given in Fig. 4. The real pertinent factor is

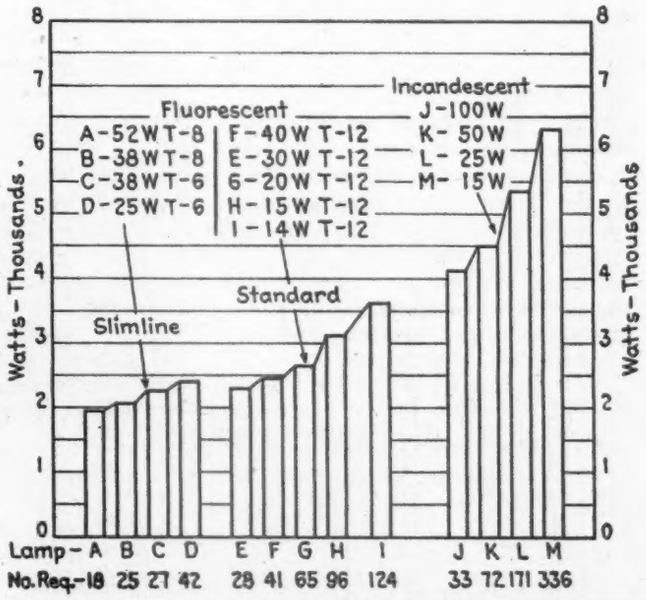


Fig. 5—Comparison of incandescent lamps with slimline fluorescent and standard fluorescent lamps showing power requirements to give 30 footcandles at reading level in a 56-ft. passenger compartment

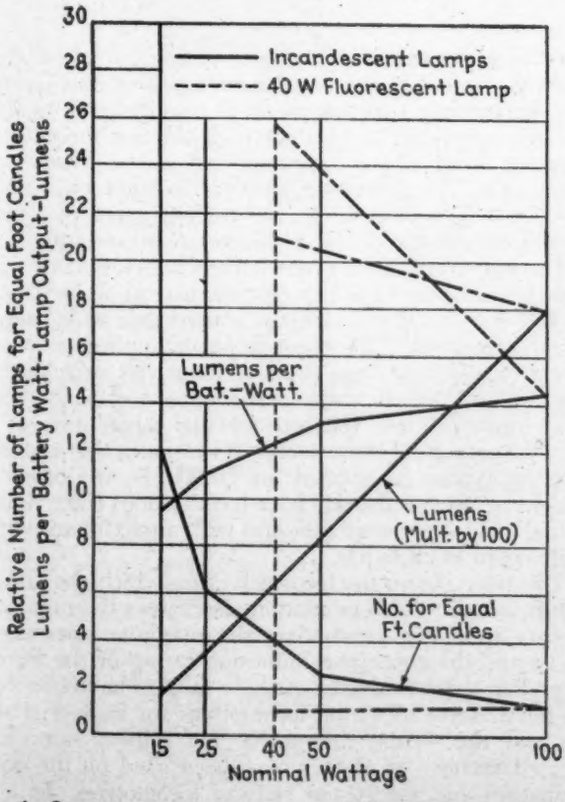


Fig. 4—Comparison of incandescent and fluorescent lamps showing relative lumen output, lumens per watt, and number of lamps for equal footcandles

the comparison of lumens per battery watt taking into account the regulator (d.c.) and motor-alternator (a.c.) efficiencies. It is shown that the 40-watt fluorescent lamp gives 25.7 lumens per watt, whereas, the 100-watt incandescent lamp gives 14.4 lumens per watt and a 40-watt incandescent, if available, would give approximately 12.5 lumens per watt or slightly less than ½ of the 40-watt fluorescent lamp.

Another item and one directly affecting cost and maintenance is the number of lamp replacements based on the 40-watt fluorescent lamp. The replacement will depend on the ratio of the number of lamps required to give equal footcandles at the reading plane together with the relative life of the two types of lamps. Incandescent lamps have a rated life of 1,000 hours. The fluorescent lamps, affected by the number of lamp starts, have a rated life of from 2,500 to 6,000 hours, depending on the burning hours per start. Assuming six burning hours per start, which seems reasonable for the average railroad service, then the curve, Fig. 4 gives the average replacements for the size of lamps chosen, as compared with one for the 40-watt fluorescent lamp.

An important item of vital concern to the maintenance department is the battery load or the power requirements for such a system of lighting. To bring out the

great advantage of the fluorescent system, the power requirements for equal lumens at the reading level, applied to a 56-ft. passenger compartment is shown in Fig. 5. The data shows the number required for the different sizes of incandescent and fluorescent lamps and the power requirements. For instance, 72 of the 50-watt incandescent lamps would be necessary, compared to 28 of the 40-watt fluorescent, and the power required, including the efficiency of the system, (the incandescent 80 per cent and the fluorescent, including the motor alternator to obtain a.c., 60 per cent) is 4,500 watts as compared to 2,287 watts, or practically double.

Lamp maintenance is also an important factor for consideration. The fluorescent lamp has the advantages as shown by the curve, Fig. 6.

The cost of initial installation (lamps only) of the 50-watt incandescent vs. 40-watt fluorescent is about one-half for equal lumens in a 56-ft. passenger compartment. Referring, however, to the other part of Fig. 6 (cost per hour of operation), the very much lower value for the fluorescent means that the difference in initial cost is soon paid for and then the full savings are realized. This difference in the initial cost of $8.74 is paid for after approximately 1,550 hours operation. The slimline lamp, having just come on the market, is at a slight disadvantage at present due to higher first cost.

No consideration has been given in the data, Fig. 6, to the fixture cost. Fluorescent lighting fixtures will, undoubtedly, cost more than the incandescent sockets and concealing fixtures, but this additional cost should hardly be charged to the lighting system but rather to the car body and considered as part of the overall internal streamlining and decorative effect.

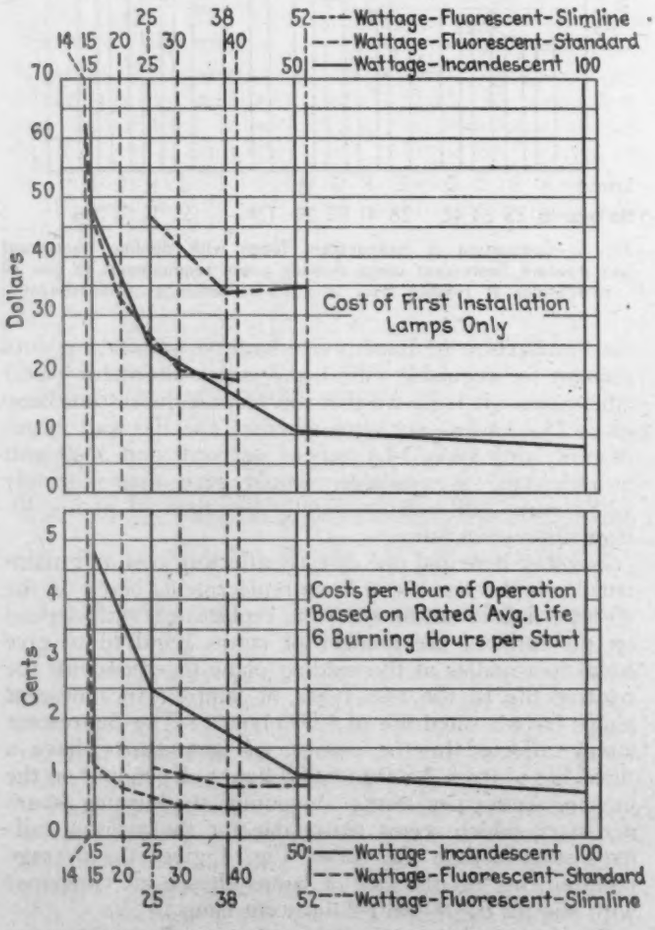


Fig. 6—Comparison of incandescent lamps with slimline fluorescent and standard fluorescent lamps showing installation and operation costs for 30 footcandles in a 56-ft. passenger compartment

The next step in the study of passenger-car lighting is the consideration of illumination, the type of fixtures, together with the layout which will provide the desired intensity and distribution of light. These factors will be considered in a subsequent article.

Double-Reduction Traction Motor

(Continued from page 369)

engines are used and where heavy loads are handled at low speeds and high tractive forces. Figure 4 shows comparative efficiencies of various motors based on motor losses at 110 deg. C. copper temperature, with an assumed two volts for brush drop. Curve A is for the older type of single-reduction motors such as were being built in the period 1925 to 1930. Curve B is for single-reduction motors as they are built today. Curve C is for the double-reduction motor. All three of these curves are based on the maximum reduction which can be used and still maintain clearance under the gear case as specified by the Interstate Commerce Commission. A study of these curves clearly shows the advantage of the double-reduction motor for locomotives that are required to operate at moderate or low speed and to produce high tractive force. At the starting point of the locomotive all of the losses are in resistance. The difference between Curve B and Curve C in Fig. 4 shows the additional tractive force that can be produced with the double-reduction motor over the single-reduction motor for a given horsepower loss. For example, this amounts to 47 per cent increase at 30 hp. loss.

Table I—Locomotives Equipped with Double-Reduction Traction Motors

Weight Tons	No. of Motors	Max. Speed	Adhesion Per Cent
Industrial Diesel-Electric Locomotives			
25	1	20	11.7
45	2	20	11.7
65	4	30	11.5
Railway Diesel-Electric Locomotives			
44	4	35	14.6
70	4	25	12.5

The double-reduction motor is used on a wide range of locomotive sizes. The motor has been applied on locomotives for all classes and types of industrial switching and also for lightweight railway switching and road service.

A rule-of-thumb measure of the capabilities of the motor is given by these facts: With maximum reduction gearing it can be applied on 50,000 lb. of locomotive weight per motor and will have a continuous tractive force rating of 11.7 per cent adhesion with a maximum permissible speed of 20 m.p.h.

The table shows the locomotives on which the GE-733 motor is used. This tabulation also shows the number of motors used per locomotive, the maximum permissible speed and the continuous adhesion rating of the locomotive. The largest number of these motors have been used on the 25-ton and 45-ton locomotives for industrial service and the 44-ton locomotive for railway service. A limited number of motors have been used on the 65-ton industrial and the 70-ton railway locomotives. In all of these applications, the double-reduction motors have given excellent service.

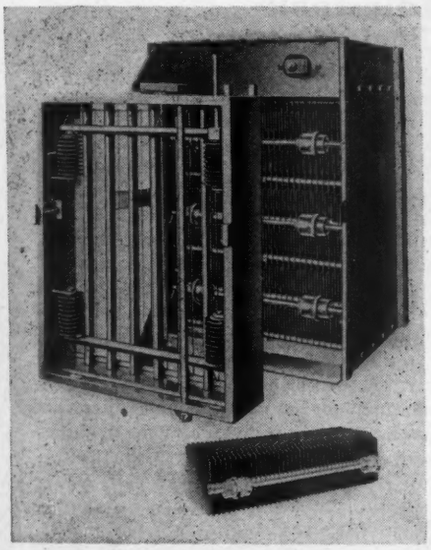
NEW DEVICES

Electronic Air Filter

The Electro-Cell, a unit type electronic air filter with removable collector-plate assemblies, is now manufactured by the American Air Filter Co., Inc., Louisville, Ky.

The positive and negative collector plates are assembled on cross rods to form horizontal groups which are easy to handle and may be readily removed from the filter casing. This makes possible a number of innovations in construction which simplify installation, improve performance, and assure better maintenance.

Sliding into the filter casing in much the same manner as a desk drawer, plate assemblies can be removed for cleaning and re-oiling at convenient water and sewer connections. By keeping a spare set of plates sufficient for one section for use as a replacement, the length of time the filter is out of service is reduced to a minimum and the dirty collector-plate assemblies can



Electro-Cell unit-type electronic air filter with removable collector-plate assemblies

be cleaned at a time that is most convenient for maintenance personnel. An automatic washing device has been developed permitting collector-plate assemblies to be washed in place for installations where manual washing is not feasible.

Standard sections of the Electro-Cell are 2 and 3 ft. in width with a capacity of 1,000 c.f.m. per unit and range from this minimum to as many sections as are needed for the particular installation. The construction of the filter is such that it eliminates the duplication of top and bottom sections of box-like units when assembled one upon another. This is accomplished by the manufacture of the filter in a variation of heights from a minimum of 27 in. to a maximum standard height of 15 ft. by 9 in. increments.

In the larger sizes of the Electro-Cell (6 ft. or higher), the ionizers are mounted on a bar hinge which swings clear of duct work or adjacent sections giving full access to collector plates. Extending the full height of the section, electrical losses are reduced to a minimum due to fewer wire ends.

Totally Enclosed Motor

A totally enclosed, fan-cooled motor designed for use in extremely dusty, dirty, and corrosive atmospheres has been added to the line of General Electric Tri-Clad induction motors. The motor is available in stand-



General Electric Tri-Clad, totally enclosed motor for corrosive atmospheres

ard, explosion-proof, and dust-explosion-proof types from 1 to 1,000 hp. and can be used where iron dust and metal filings are in the air and in Class I, Groups C and D, and Class II, Groups E, F, and G hazardous locations. Short in length and compact in construction, the motor can be installed in a small space, making it suitable for machine-tool applications where the motor must be part of the driven machine.

The Tri-Clad motors feature a double-shell, cast-iron frame, and cast-iron end shields and conduit box for protection from external blows, dripping water, dusts, vapors, and corrosive liquids. Sealed end shields and inside joints, and a one-piece, double-shell stator protect windings, punchings and rotating parts from moisture or corrosive elements. Long, close-running shaft fits, supplemented by a rotating seal, keep dirt from entering the motor along the shaft. Punchings and windings within the inner shell of the motor are cooled by a non-sparking external fan which is protected by a cast-iron housing with a screened air-intake opening.

The cast-iron bearing housings are cast integral with the end shields as a barrier to the entrance of foreign materials. An inner cast-iron bearing cap makes a complete enclosure for the bearing. As on all ball-bearing Tri-Clad motors, the pressure-relief greasing system is used. Greasing can be accomplished without disassembling or stopping the motor.

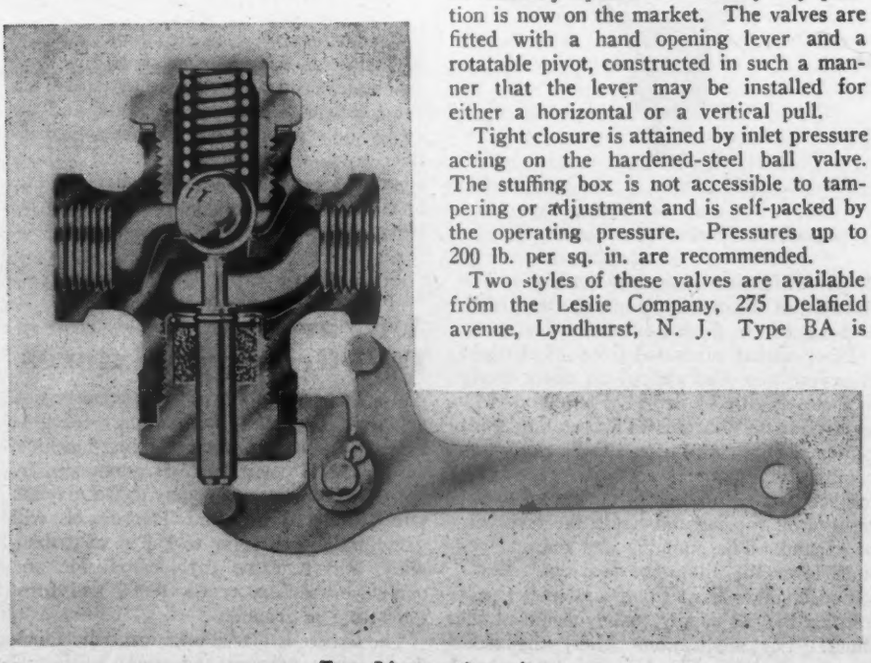
Low starting current, with balanced design, makes the motor suitable for full-voltage starting, permitting the use of simple, inexpensive control equipment. The motor has high pull-up torque for snappy acceleration, and high maximum running torque to meet temporary abnormal peaks and low-voltage conditions.

Air Operating Valve

A self-sealing, ball-type air valve that can be instantly opened from nearly any position is now on the market. The valves are fitted with a hand opening lever and a rotatable pivot, constructed in such a manner that the lever may be installed for either a horizontal or a vertical pull.

Tight closure is attained by inlet pressure acting on the hardened-steel ball valve. The stuffing box is not accessible to tampering or adjustment and is self-packed by the operating pressure. Pressures up to 200 lb. per sq. in. are recommended.

Two styles of these valves are available from the Leslie Company, 275 Delafield avenue, Lyndhurst, N. J. Type BA is

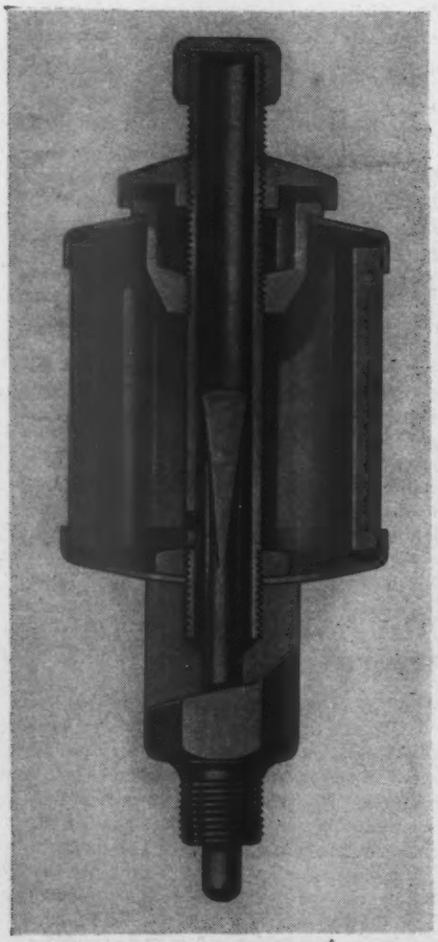


Type BA operating valve

shown. Type BAC is identical except for the substitution of a cam-operated lever for the standard lever. The cam feature holds the valve in the open position until manually returned to its original position. Both types have cast-iron bodies, integral seating surfaces and screwed connections. They come in ½-in. sizes.

Vibrating Rod Bottle Oiler

The vibrating rod bottle oiler, of which a cutaway view is shown, is automatic in operation and refillable without removal from its installation. It is designed for use on bearings where light — or medium — bodied oils are satisfactory and is particularly suitable for dusty surroundings. The function of the oiler is to prevent dust, dirt, and chips from getting into oil holes.



Details of the vibrating rod bottle oiler

In operation, oil is fed from an air-tight reservoir to a feed rod which slides freely in a closely-fitted hole in the base and rides lightly on the journal. The rotating shaft causes a slight vibration of the feed rod, resulting in a pumping action. As the bearing becomes warm, heat is conducted to the reserve oil causing the air in the reservoir to expand. The pumping and thermal actions force the oil to the bearing.

Construction is of brass and lucite, permitting the oil supply to be visible at all times. For applications where the temperature exceeds 150 deg. F, glass reservoirs may be had. The reservoir is closed air tight by the filler cap, which is unscrewed to replenish the oil supply. The oil port to the bearing is located slightly above the bottom of the reservoir to allow dirt to settle without entering the port. Capacities from ½ oz. to 32 oz., having ⅛-, ¼-, ⅜-, or ½-in. pipe threads, are available from the Oil-Rite Corporation, 3466 South 13th street, Milwaukee, Wis.

High-Speed Bench Drill

A lightweight, high-speed bench drill is now in production at the Dumore Company, Racine, Wis. Accommodating drills ⅛-in. and smaller, the machine is designed particularly for use in fabricating small parts of wood, plastic, or metal.

The operator is free to use both hands for the drilling operation. The speed is controlled by a foot rheostat throughout the range of 2,000 to 15,000 r.p.m. Drilling is accomplished by elevating the table to the drill. A geared hand control is used to obtain proper work feeding speed.



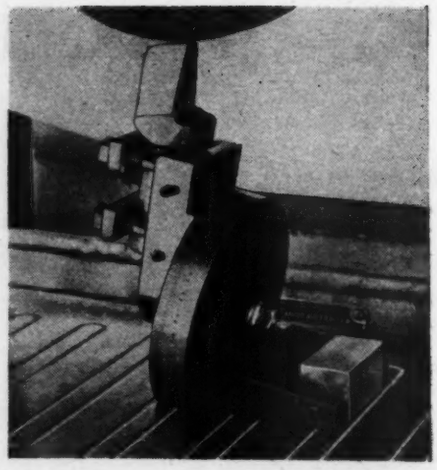
Lightweight drill with foot rheostat

Locking devices hold the motor and the drill rigidly in place on the solid, polished-steel column, yet permit vertical adjustment and rotation through 360 deg. The total weight of 15 lb. permits easy portability if desired.

All-Purpose Tool-Grinding Fixtures

An all-purpose fixture for the precision grinding of lathe tools, screw-machine form tools, shaper, planer, milling-machine, or any angle cutting tool is announced by the George Scherr Company, 200 Lafayette street, New York 12. The device will grind tools from ⅛ in. to 1¼ in. of carbon, alloy, and tungsten carbide. Inside and outside threading, recess tools, and form tools may be ground.

The fixture is placed on a magnetic chuck of a surface grinder, and works on a patented principle involving the use of compound angles. It is graduated in degrees up to 90 with angles both left and right obtainable. The rake angle is ground on the tool by means of a tipping block, which gives 3-, 5-, 7-, and 10-deg. clearance.

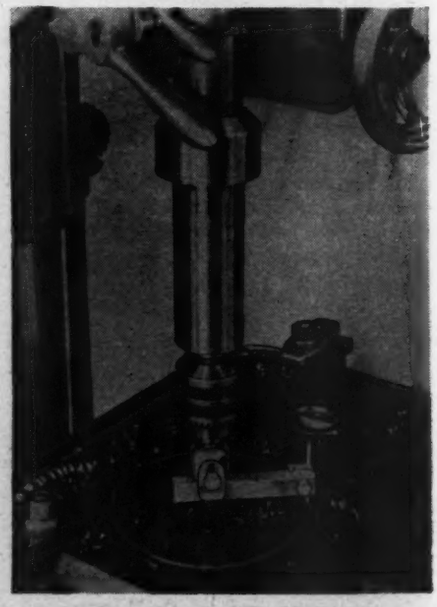


The all-purpose tool-grinding fixture in place

Adjustable Circle Cutter

An adjustable circle cutter for holes from 1⅞ in. to 8 in. in diameter will cut through ¼-in. thicknesses in steel or other tough materials, and up to 1½ in. in plastics, fibre, or wood. The thicknesses may be doubled if the cut is taken on both sides of material.

This tool is designed to operate in any standard drill press, wood-working machine, or suitably mounted spindle machine. It consists of a combination drill and pilot with a high-speed cutting blade, adjustable to depth and diameter. The cutting blade is resharpened by grinding on one edge only. A twin-blade holder with a fixed ½-in. center for cutting washers, discs, and gaskets is also available from the manufacturer, Bruno Tools, Beverly Hills, Calif.



Bruno adjustable circle cutter

High-Speed Sawing Machine

The Zephyr 16 sawing machine has a 16-in. throat depth, a 10-in. thickness capacity, and a cutting speed range variable from 1,000 to 5,000 ft. per min. It is designed to cut through ⅛-in. stainless steel at 48.6 in. per min. and 13-gage sheet steel at 150 in. per min. Wood, plastics, and non-ferrous materials are cut at corresponding rates.

The table is the tilting type. There is a disc cutting attachment for making circles, a rip fence, and a mitering attachment for the cutting of regular and compound angles. Hardened-steel saw guides with a roller back-up bearing hold the blade to a close tolerance for straight cuts. This machine is manufactured by the DoAll Company, 1301 Washington avenue South, Minneapolis 4, Minn.



The Zephyr 16 is a high-speed saw for metals, woods, and plastics



Cincinnati 6 in. by 30 in. plain hydraulic grinding machine

Hydraulic Grinders

A line of four precision center-type plain grinding machines is now available from the Cincinnati Milling and Grinding Machines, Inc., Cincinnati 9, Ohio. Sizes of these machines are 6 in., 10 in.-L, 10 in., and 14 in.-L. The two sizes followed by "L" are light types, having the characteristics and built in the same lengths as the sizes preceding them, but having the extra swing capacity to accommodate a flange or projecting arm on the work.

Table traverse rates are variable from 3 in. to 200 in. per min through a knob control. A single lever starts and stops the table traverse and coolant flow, or the coolant may be relegated to hand control by a push-pull knob. The length of table traverse may be automatically controlled from 3/32 in. to full stroke, while tarry at each end of the stroke is independently adjustable from 0 to 5 seconds. A Servo control is provided for moving the table 1 in. per revolution.

Cross traverse for the wheel head is controlled by a large handwheel which features a large graduated dial for convenience in setting up the machine. The automatic pick feed at table reversal may be set for diameter reductions of 0.0004 in. to 0.0028 in. Hand adjustment reduces the work diameter 0.0001 in. per increment of spacing on the handwheel. The cross-traverse mechanism for 6-in. and 10-in.-L machines contains a rapid hand-traverse arrangement whereby each turn of the handwheel moves the wheel head 0.125 in.

Headstocks for the 6-in. and 10-in.-L machines are powered by a ½-hp. variable-voltage a.c. motor and the other two machines by either a d.c. or a variable-voltage a.c. motor of 1-hp. rating. Speed ratios are approximately 4 to 1 for the d.c. equipment and 12 to 1 for the a.c. equipment. A V-belt drive riding on four-step pulleys is used.

Features of these machines include Filmatic bearings to maintain exact dead-center rotation, automatic lubrication with pressure-switch protection for these bearings, a pressure system for lubricating tables and cross ways, and automatic bleeding of air from the hydraulic system.

Lengths are 18 in. and 30 in. for the 6-in. and 10-in.-L machines. The 10-in. and 14-in.-L machines are built in 18-, 36-, 48-, 72- or 96-in. lengths.

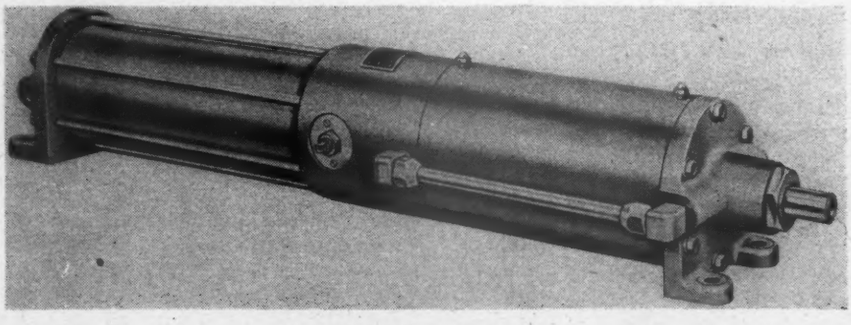
Air-Draulic Cylinders

For jobs which require accurate control of movements, but where air operation is preferred, the Logansport Machine Company, Logansport, Ind. is manufacturing Air-Draulic cylinders. The cylinders are made with separate air and hydraulic pistons assembled as an integral unit on a common piston rod.

No hydraulic power unit is required; rod movements are powered by the air cylinder, which may be controlled by any four-way valve. Large air inlets permit rapid response of the unit. The piston speed is controlled by a valve built in the hydraulic circuit.

These cylinders can be furnished for controlled feed in both directions, for controlled feed with a rapid return by means of a ball check valve built in the hydraulic piston, or for skip-feed movements by cam valves in the hydraulic circuit. The mounting types are foot, clevis, center-line, rod-end flange, blind-end flange, or a combination of any two of these. Cylinders are available in four standard sizes from 3-in. to 8-in. bore, with any length of stroke to 5 ft.

These hydraulic cylinders have a centrifugally cast barrel, honed to a mirror-like finish. The air cylinder is brass-lined steel tubing and is suitable for pressures to 150 lb. per sq. in.



Logan air-draulic cylinder

Shearcutter Tool Bit

Savings up to 50 per cent in cutting time and 70 per cent in power consumption are claimed for the Shearcutter tool bit, which



A ⅜-in. Shearcutter bit taking a 1⅛-in. cut in cold-rolled steel

is designed for cutting metals with a knife-like action.

According to the manufacturer, the Fearless Tool Company, 1234 South Gramercy Place, Los Angeles 6, Calif., the use of this tool enables precision tolerances to be held, finishing cuts often eliminated, and digging in and chattering prevented. The Shearcutter may be used on plastics, ferrous, or non-ferrous metals without changing the original grind.

Hydraulic Wheel Borer

The Niles hydraulic wheel borer has a full automatic cycle which enables the machine to remain in almost continuous operation except for the short loading and unloading time. During the boring cycle the operator is free to do any preparatory work necessary for boring the next wheel.

The fully automatic cycle begins after two preliminary pushbutton operations, one to chuck the wheel and the second to start the table. A small lever is then moved. The cycle begins with the boring ram approaching the position where the roughing cut starts and the feed is automatically changed from fast to roughing. When the roughing cut is completed the finishing cutters are in position and the feed automatically changes to the proper rate for finishing. Upon completion of the finishing cut the feed changes for chamfering, and the boring ram is held by a positive stop while the chamfer is completel automatically. Following the completion of all cuts, the main motor is de-energized and the brake automatically brings the table to a stop. The final two automatic operations return the boring bar by fast traverse to the starting point and release the table brake.

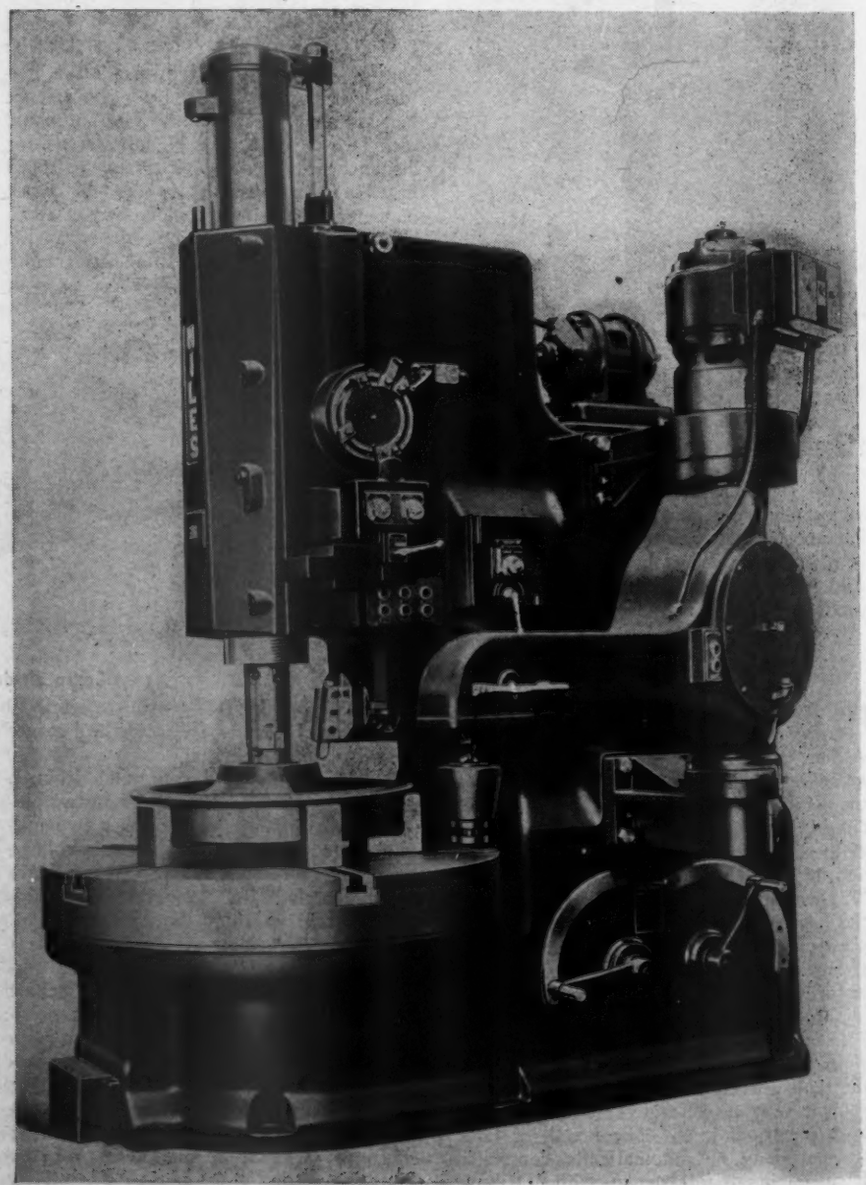
The 53-in. diameter chucking table will accommodate wheels up to 48 in. in diameter, and down to 29 in. with standard jaws, or 15 in. by reversing the jaws. The vertical boring ram will bore holes up to 9 15/16 in. in diameter at roughing feeds up to 6 in. per min., and finishing feeds to 18 in. For hub facing, the feed ranges from 0 to 7½ in. per minute.

The wheel is automatically chucked and unchucked. Five radial T-slots in the top of the table receive the steel chuck slides. The table-driving bevel gear drives a cam plate which engages the five chuck slides and jaws mounted thereon, simultaneously moving them radially and thereby centering and chucking the wheel. To prevent liquid from entering the table track and spindle, the outer rim of the table is machined to effect a seal with the table base and the cam plate housing is completely enclosed.

The column, or upper part of the machine frame, is a heavy box-type casting and encases the hub facing ram, the vertical boring ram, and completely enclosed in this part are the feed cylinder, piping and control, and a large hydraulic oil reservoir. The table base is accurately machined and bored directly in line with the bearing for the vertical boring ram to assure permanent alignment with the bore and outside diameter of the wheel. The table brake and its operating cylinder are attached underneath the table base and are accessible through a large opening in the foundation. The speed box is in the rear portion of the base, which also serves as a lubricating-oil reservoir for the table and drive box. The main drive motor is mounted opposite the operator's side on the base.

The operator's side is arranged to attach a hoist, and contains all control levers and buttons within easy reach of the operator. Three main drive motors are available. For high-speed steel a 15-hp. motor is used and gives a table speed range of 7 to 30 r.p.m. A 30-hp. motor with a table speed range from 30 to 125 r.p.m. is used for carbide cutting tools. To use for either type of tool, a 15/30 hp. motor gives a speed range of 7 to 125 r.p.m. Auxiliary motors of 3 hp. each drive the hydraulic pump and the electric hoist, while the lubricating-pump motor is ¾ hp.

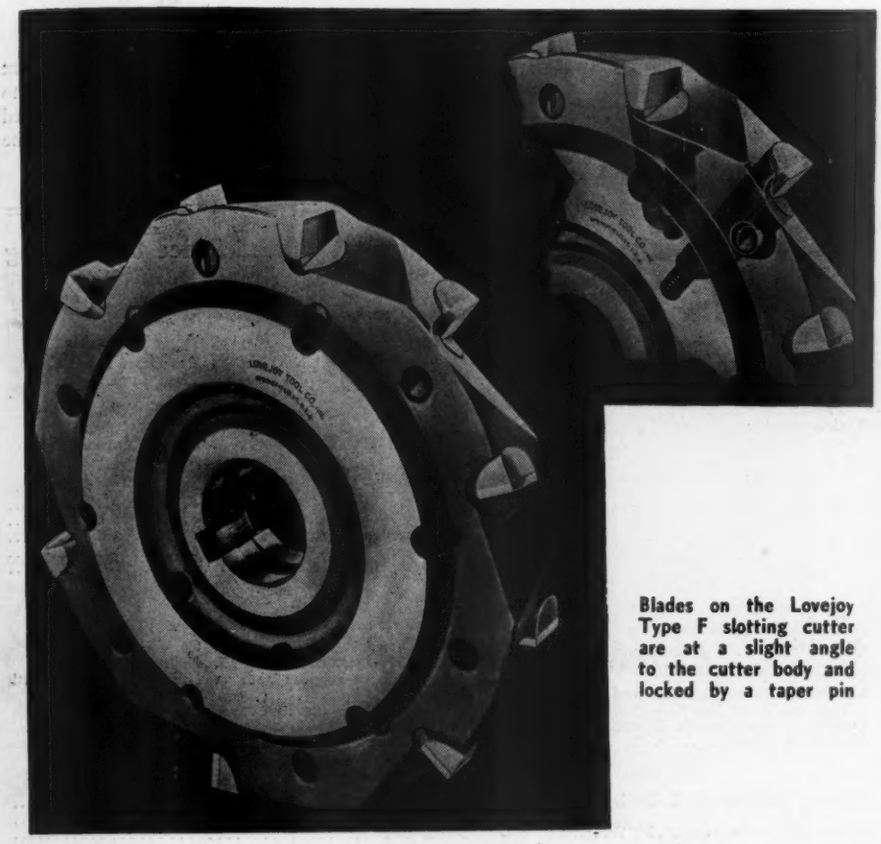
The hydraulic wheel borer is a product of the General Machinery Corp., Niles Tool Works Division, Hamilton, Ohio.



The Miles Hydraulic Wheel Borer is designed to rough, finish machine, chamfer the bore, and face the hub of steel or cast iron wheels with minimum time and effort

Slotting Cutter

Addition of a screw adjustment to the blade locking device results in sensitive control of the blade settings on the redesigned Type F slotting cutter made by the Lovejoy Tool Company, Inc., Springfield, Vt.



Blades on the Lovejoy Type F slotting cutter are at a slight angle to the cutter body and locked by a taper pin

As all blades are set at a slight angle to the cutter body, adjustments either for sharpening or for control of the slot width are made by turning the recessed-head screw at the bottom of each blade. These screws are easily turned after the locking device is loosened by unseating the tapered pin. When adjustment is completed the blade is locked by reseating the tapered pin.

Ruggedness of construction is featured. Removal of several blades for fly cutting is said to be possible without affecting the housing strength.

The cutters are available in face widths from 7/16 in. to 1½ in. and in diameters 5 in. to 18 in.; rake may be positive or negative. The blades may be of either cast alloy or high-speed steel.

Fixture with New Lamp Arrangement

A fluorescent lighting-unit principle, given the trade name "Tandemlamp," uses an axial plane mounting which places one lamp above the other, for better utilization of the particular characteristics of fluorescent lamps. Small specular reflectors are used for accurate control of light and to obtain compactness of equipment. This lamp arrangement introduces a minimum of opaque surface into the path of reflected light, blocking less of the reflected light in identical size reflectors, than would occur with the major axis of the lamp assembly positioned laterally.

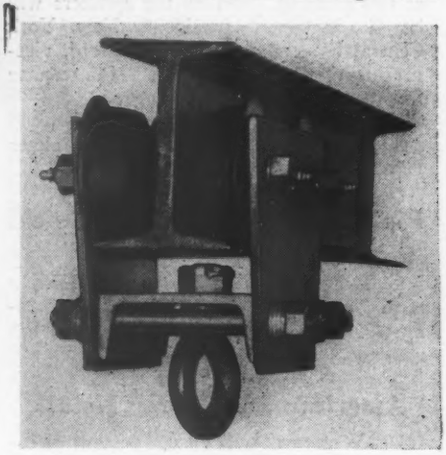
A louvered plastic sheet material, known as "Louverplas", with fine, parallel, translucent louvers separated by clear plastic spacings fixed in juxtaposition and traversed by minute prisms is used at the bottom of the fixture for the brightness control essential to good lighting and visual comfort.

"Tandemlamp" and "Louverplas" are patented by the Doane Products Corporation, Meriden, Conn., and represented by the Ivan T. Johnson Company, Inc., 95 Madison avenue, New York 16.

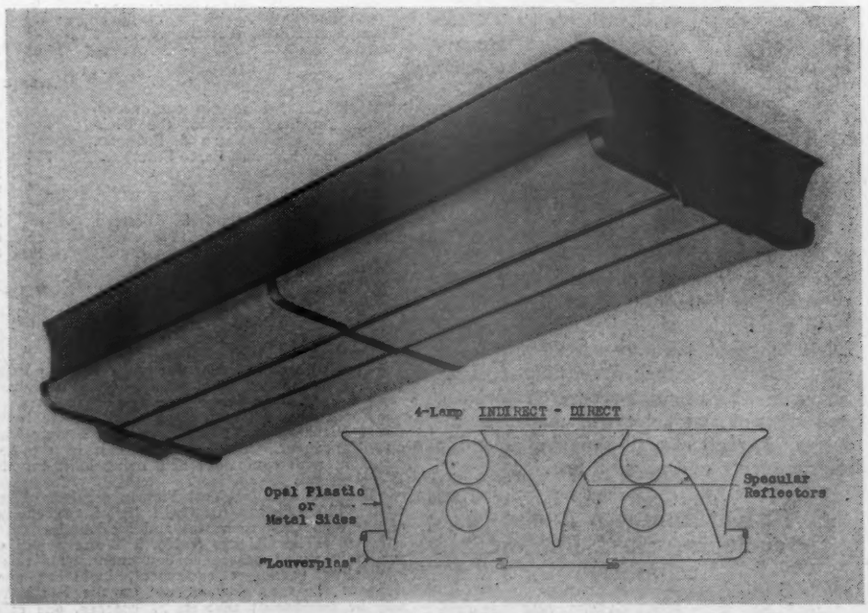
Mono-rail Trolleys

A line of trolleys and trolley wheels is available from the Gray Hub Company, 17265 Gable avenue, Detroit 12, Mich., in standard capacities from 250 lb. to 2 ton and in special sizes to 5 ton. The trolleys are adjustable for various-sized I-beams by changing the combination of the spacers.

Featured in the design of all wheels are Gray ball bearings with 86 per cent bearing surface, which is half again as much surface as a conventional ball bearing. This is attained by having a 310 deg. ball contact instead of the normal 205 degrees. The bearings are hardened throughout, completely sealed, and lubricated through a grease fitting and reservoir. Wheels are available in tread diameters to 5 in., with crown-taper or flat-wheel treads, and with single or double ball races.



The Gray trolley is adjustable to suit various-sized I-beams



One of the "Tandemlamps" with a sketch showing the arrangement of the lighting units

NEWS

Mechanical Division To Meet August 8 and 9

DECISION to hold the deferred annual meeting of the Mechanical Division, Association of American Railroads on August 8 and 9, at the Congress Hotel, Chicago, with full member attendance, was made at a meeting of the Mechanical Division General Committee held at Chicago on June 19. The reports of standing and special committees will be presented and acted upon at this meeting. Among the speakers will be G. Metzman, president, New York Central System, and C. Hungerford, vice-president, Operations and Maintenance Department, A. A. R.

The Purchasing and Stores Division will meet on August 8 and 9 at the Palmer House, Chicago.

Ripley Resigns From Technical Board

C. T. RIPLEY, chief engineer of the Technical Board of Wrought Steel Wheel Industry, with headquarters at Chicago, has resigned.

American Society for Metals

DR. WILLIAM A. MUDGE, assistant director of the Technical Service of International Nickel Company's Development and Research Division, at New York, has been elected Chairman of the New York Chapter of the American Society for Metals, to serve during the coming year, 1946-47. During the past year Dr. Mudge has been Chairman of the Technical Program Committee.

Returning from World War I as an infantry captain, Dr. Mudge entered Columbia University for post-graduate work, and received his Ph. D. in 1920. Soon after he became associated with the Nickel Company as refinery superintendent and Metallurgist at the Huntington Works. He was appointed to his present position in April, 1940.

Dr. Mudge is the author of many technical papers on nickel and nickel alloys.

National Instrument Conference and Exhibit

THE first National Instrument Conference and Exhibit of the Instrument Society of America will be held in the William Penn hotel, Pittsburgh, Pa., September 16-20, 1946. A program, consisting of 15 sessions, has been arranged for this meeting. Subjects which will be covered include: measurement and automatic control in industry, inspection and gauging, scientific measurements, and physical testing.

C. F. Kottkamp to Assist in Developing B. C. R. Test Locomotive

CHARLES F. KOTTKAMP has joined Bituminous Coal Research, Inc., to assist John I. Yellott, director of research, in locomotive development work. Mr. Kottkamp, who as a lieutenant commander has a background of experience as officer-in-charge of gas-turbine test division, U. S. Navy, is now working on the development and testing of the type of gas turbine to be used to power the B. C. R. coal-fired locomotive. His headquarters are in the O'Sullivan Building, Baltimore, Md.

Orders and Inquiries for New Equipment Placed Since the Closing of the June Issue

LOCOMOTIVE ORDERS

Road	No. of locos.	Type of loco.	Builder
Chesapeake & Ohio	30[1]	2-8-4 frt.	American Loco. Co.
	10[1]	2-8-4 frt.	Lima Loco. Wks.
Chicago, Milwaukee, St. Paul & Pacific	5[2]	6,000-hp. Diesel-elec.	Fairbanks-Morse
Union Pacific	1[3]	6,000-hp. Diesel-elec.	Fairbanks-Morse
West Virginia Northern	2	1,000-hp. Diesel-elec.	Electro-Motive

LOCOMOTIVE INQUIRIES

Road		
Great Northern	3	2,000-hp. Diesel-elec. pass.
	2	3,000-hp. Diesel-elec. pass.
	3	3,000-hp. Diesel-elec. frt.
	4	1,500-hp. Diesel-elec. pass.
	8	1,500-hp. Diesel-elec. rd. sw.

FREIGHT-CAR ORDERS

Road	No. of cars	Type of car	Builder
Ann Arbor	50	50-ton box	Co. shops
Atchison, Topeka & Santa Fe	350	40-ton refrigerator	Pullman-Std.
Central of Pennsylvania	125	70-ton cement hoppers	Harlan & Hollingsworth
Continental Carbon Co. and Panhandle Carbon Co.	20	Covered hopper	General American
Denver & Rio Grande Western	10	Caboose	Pressed Steel
Norfolk & Western	250	50-ton box	Co. shops

FREIGHT-CAR INQUIRIES

Road		
Chicago, Indianapolis & Louisville	500	50-ton box
	150	50-ton flat
Delaware, Lackawanna & Western	500	50-ton box
	1,000	50-ton hopper
Illinois Central	1,000	50-ton box
	500	40-ton box
	400	50-ton hopper
Kansas City Southern	100	70-ton pulp-wood
New Orleans Public Belt	5	70-ton covered hopper
Northern Pacific	250	40-ton refrigerator
Union Pacific	1,000	50-ton box
	500	50-ton auto
Union Tank Line	500	50-ton tank

PASSENGER-CAR ORDERS

Road	No. of cars	Type of car	Builder
Missouri Pacific	4	Sleeping	Budd Co.
Pennsylvania	6	Sleeping	Budd Co.
Seaboard	6	Sleeping	Budd Co.
Union Pacific	15[4]	Sleeping	American Car & Fdry.
Chicago & North Western	4[4]	Sleeping	American Car & Fdry.
Wabash	4[4]	Sleeping	American Car & Fdry.

PASSENGER-CAR INQUIRIES

Road		
Atlantic Coast Line (in conjunction with the Pennsylvania, the Richmond, Fredericksburg & Potomac, and the Florida East Coast)	71[6]	Sleeping
	13[6]	Dining
	30[6]	Coaches
	3[6]	Baggage
Delaware, Lackawanna & Western	6	Sleeping
Great Northern	3[5]	Coaches
	1[5]	Coffee-shop-obs.
	1[5]	Mail-bagg.-exp.
Reading	8	Multiple-unit

[1] The 40 locomotives will cost approximately $9,000,000. Delivery expected during fourth quarter of this year.

[2] Ordered in April.

[3] This three-unit locomotive prior to its purchase by the Union Pacific was operated in test service for five months on both passenger and freight runs. At present it is geared for passenger service.

[4] For joint operation by the respective lines.

[5] For a new streamline train for service between St. Paul, Minn., and Grand Forks, N. D. The Great Northern also plans to operate similar trains on the Pudget Sound line between Seattle, Wash., and Vancouver. The estimated cost of the new trains, which will be identical in design and construction with equipment now being built for the "Empire Builders," is $700,000 each, including the Diesel-electric locomotives.

[6] For use in New York-Florida service. The cars will be of light-weight, stainless-steel construction. The sleeping cars will be of the enclosed, private-room type, consisting of drawing rooms, double bedrooms, roomettes and bar-lounges.

NOTE:—The Chicago & North Western will shortly place orders totaling approximately $11,726,000 for freight and passenger equipment. Of this total $7,399,000 will be applied to the purchase of streamline passenger equipment, including one 1,000-hp. and 15 2,000-hp. Diesel-electric locomotives of the type now in use on the North Western's "400" fleet. A total of 46 passenger cars will be purchased; that is, 27 coaches, one cafe-coach, four mail-baggage cars, one dining car, nine parlor cars and four tap-diner-lounge cars. The freight equipment will consist of eight 4,500-hp. Diesel-electric locomotives for main-line service and 140 70-ton covered hopper cars.

Mr. Kottkamp entered the Navy in 1942 where his duties included studies of steam turbine operation and maintenance both ashore and at sea. He holds the degree of B.S. in mechanical engineering from Bucknell University where he majored in turbine design, power-plant design and operation, and thermodynamics. He entered industry in 1936 and was with the Carnegie-Illinois Steel Corporation, the Westinghouse Electric Corporation, and the Gulf Oil Corporation in work related to applications and operation of the steam turbine.

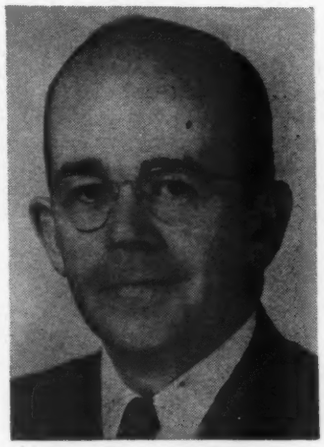
According to the April-June bulletin of Bituminous Coal Research, Inc., at a recent meeting of the Technical advisors of the Locomotive Development Committee, proposals of four manufacturers were heard on supplying gas-turbine equipment for the B. C. R. test locomotive. It was the opinion of the group that a power unit developing about 3,750 shaft hp.—3,000 hp. at the rails—would be the most useful size. Because of a long delay in obtaining a turbine after the order is placed, the purchase of a turbine unit is now under consideration.

The committee also discussed large-scale testing of the coal-handling equipment and the combustion system for the gas turbine to be carried on at the Dunkirk, N. Y., plant of the American Locomotive Company where facilities include sufficient high-pressure air to burn up to 1,000 lb. of coal per hr.

It is anticipated that a detailed design for a locomotive will be ready as soon as tests of the turbine and related equipment assure success of the enterprise.

E. D. Benton Joins Staff of Battelle Institute

E. D. BENTON, formerly fuels engineer of the Louisville & Nashville, has been named to the staff of the Battelle Institute, Columbus, Ohio, where he will be engaged in research on the utilization of fuel in locomotives.



E. D. Benton

Mr. Benton, known for his work on locomotive smoke prevention, has been the representative of the L. & N. on the Technical Advisory Board of Bituminous Coal Research, Inc. In that capacity, he was largely responsible for the initiation of the research study by Bituminous Coal Research which resulted in an improved steam-air jet for coal-burning locomotives. He was also instrumental in the installation of steam-air jets on locomotives of the L. & N. and of many other systems, by which these smoke-abating mechanisms were given practical service tests. With R. B. Engdahl, of the Battelle Institute, he was co-author of a paper on steam-air jets for locomotive smoke abatement which was presented before the Cincinnati, Ohio, meeting of the American Society of Mechanical Engineers in the fall of 1945.

Mr. Benton attended the University of Minnesota, following which he was an engineer for several Illinois power plants. In 1936 he became a fuel engineer for the Elkhorn Coal Corporation, Cincinnati, and in 1938 became associated with the Carter Coal Company, New York. He joined the engineering staff of the L. & N. in 1942. He is a member of the Executive Committee of Fuels Division of the American Society of Mechanical Engineers and of the Railroad Committee of the Smoke Prevention Association of America. He is also a member of the Railway Fuel and Traveling Engineers' Association.

Supply Trade Notes

THE COOPER-BESSEMER CORPORATION.—*Fletcher M. Devin* has been appointed manager of the Railway Engine Division of The Cooper-Bessemer Corporation, Mount Vernon, Ohio. The appointment is coincidental with the company's recent development of a new line of Diesels adaptable to locomotive service in sizes from 300 to 1,600 hp. Mr. Devin has been associated with Cooper-Bessemer for the past 25 years, during which time his activities as sales engineer have extended into nearly every phase of the company's markets, including the sale of compressors, gas engines and Diesels for industrial, marine and rural electrification applications. His activities as manager of the Railway Engine Division will include development of mobile power units as well as their sale. Simultaneously, Mr. Devin becomes a member of the company's Operating Committee and will have a voice in the determination of all company policies.



F. M. Devin

◆

OXWELD RAILROAD SERVICE CO.—*Gilbert P. Bogert* has been elected president of The Oxweld Railroad Service Company, a Unit of Union Carbide and Carbon Corporation. Mr. Bogert succeeds *John H. Rodger* who has been elected chairman of the Board. Recently Mr. Rodger was elected vice-president of Union Carbide and Carbon Corporation in charge of the railroad division.

Gilbert P. Bogert is a graduate of the University of Virginia (1913). Since that time he has been continuously associated with various Units of Union Carbide and Carbon Corporation, with the exception of a period of service as a lieutenant in the Air Corps during the first World War. He was overseas eighteen months, attached to the Italian Air Force. Following his release from the Army, Mr. Bogert was assistant to the sales manager of The Linde Air Products Company in New York. His next position was western sales manager of the company in Chicago. He was later appointed sales manager, eastern division. During a seven-year residence in Canada starting in 1923, Mr. Bogert was general manager of Dominion Oxygen Company, Ltd.; The Prest-O-Lite Company of Canada, Ltd.; and the Canadian Railroad Service Company, Ltd. In 1927 he became vice-president of the first two of those companies, and last year he was elected president of Canadian Railroad Service Company, Ltd. When Mr. Bogert was elected vice-president of The Oxweld Railroad Service Company in 1930, he moved to



G. P. Bogert

Chicago where the general offices of the company are located. He became executive vice-president of the Company in 1944. Mr. Bogert is a member of the Western Railway Club, Toronto Railway Club, Canadian Railway Club, and Southeastern Railway Club.

◆

GLOBE STEEL TUBES COMPANY.—*Gilbert H. Krohn* has been appointed manager of sales for the Detroit, Mich., district sales office of the Globe Steel Tubes Company, Milwaukee, Wis., to succeed *Arthur A. Loeffler*, who is retiring after more than 25 years of service with the company. *Willard C. Christianson*, formerly assistant to the vice-president in charge of sales at the general sales office in Milwaukee, has been transferred to the Chicago district sales office as sales agent. *Frederick K. Kress* has been appointed sales service supervisor to succeed Mr. Christianson.



G. H. Krohn



W. C. Christianson

◆

BRICKSEAL REFRACTORY COMPANY.—*Ray P. McGovern* has joined the staff of the *Brickseal Refractory Company*. He will head the railroad department, with headquarters in Chicago.

◆

NATIONAL BATTERY COMPANY.—A complete battery laboratory was formally opened on April 16 and 17 at Depew, N. Y., by the National Battery Company. It is designed primarily for research work aimed at the development of new types of storage batteries and improved materials and manufacturing processes. It will also be used for process control in cases requiring highly accurate measurements or analyses. The laboratory is equipped for making spectroscopic studies and X-ray analyses, for photo-micrography and for doing a wide variety of physical and chemical testing. *J. L. Rupp*, vice president in charge of engineering, is director of the laboratory. He is assisted by *M. W. Dickover*, assistant chief engineer. Research activities are directed by *Dr. Eugene Willihnganz*.

◆

H. K. PORTER COMPANY.—The H. K. Porter Company, Inc., Pittsburgh, Pa., has opened a new district office in the Paul Brown Building in St. Louis, Mo. *R. E. Nelson*, previously assistant manager of the Porter process division in Pittsburgh, will be in charge of sales at the new office for Porter process equipment, Devine refinery and process equipment, Quimby pumps and Porter locomotives. Mr. Nelson is a graduate of the University of Minnesota Institute of Technology. Before joining the Porter Company he was affiliated for several years with the Mt. Vernon Car Manufacturing Company and the J. P. Devine Manufacturing Company, both of Mt. Vernon, Ill.



R. E. Nelson

◆

TELEPHONICS CORPORATION.—*Commander Hugh E. Allen*, naval aviator now completing his terminal leave, has joined the Telephonics Corporation in New York, where his appointment as manager of electronics engineering and sales has been annonuced. Since August, 1943, Commander Allen has been with the Bureau of Aeronautics, assigned to the radio-electronics branch of the engineering division. In his last Navy job he was in charge of planning of electronic systems and equipage of all naval aircraft.

◆

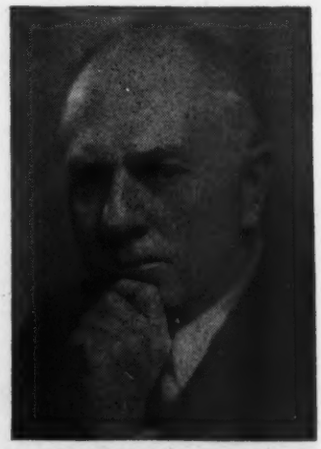
GENERAL STEEL CASTINGS CORPORATION.—*Charles L. Heater*, vice-president of American Steel Foundries, has been elected a director of the General Steel Castings Corporation and *Einar G. Hallquist* and *Karl S. Howard* have been elected vice-presidents.

Einar G. Hallquist began his career with the Commonwealth Steel Company in 1909 in the product engineering department and in 1919 was appointed mechanical engineer, later becoming chief mechanical engineer. In 1929, after the acquisition of Commonwealth Steel by General Steel Castings, he was appointed chief mechanical engineer of the new company. Mr. Hallquist was elected vice-president-engineering in 1938 and continued in that position until, in 1941, he resigned because of ill health. He returned to the company in 1943 as special representative with headquarters in the Chicago sales offices. In 1945 he was appointed assistant vice-president and moved his office to the Granite City, Ill., plant, where he served until elected vice-president in charge of the Commonwealth plant.



E. G. Hallquist

Karl S. Howard is a graduate in mechanical engineering of Washington university (1909). He joined the Commonwealth Steel's plant engineering department in 1909, and in 1930, after the acquisition of Commonwealth by General Steel, he transferred to Eddystone, Pa., as mechanical superintendent of both plants. In 1935 he was appointed works manager and in 1942 supervised the design and construction of the Armour plant at Madison, Ill. He was works manager of that plant during its operation. When it closed, he was appointed general mechanical superintendent and later assistant vice-president. Mr. Howard is in charge of all business connected with the offices of general mechanical superintendent and general purchasing agent.



Karl S. Howard

STANDARD STOKER COMPANY.—*Charles J. Surdy,* assistant to the president of the Standard Stoker Company, Inc., has been elected vice-president in charge of development, research and export sales, with headquarters at New York.

◆

BALDWIN LOCOMOTIVE WORKS.—*R. Nevin Watt* has been appointed general manager of sales of The Baldwin Locomotive Works, Eddystone, Pa. *J. M. Sturges* has been appointed district manager of the Northeastern District, with headquarters in New York, reporting to Mr. Watt.

◆

HEWITT-ROBINS, INC.—*Charles F. Munroe* has been appointed manager of railroad sales, Eastern division, of the Hewitt Rubber division of Hewitt-Robins, Inc., with headquarters in New York. *Andrew*



Andrew Thompson

Thompson, who recently was discharged from the Army, has been appointed manager of transportation seating, Restfoam division. In his new position, Mr. Thompson will direct sales of the foam rubber used in railroad cars, buses, air lines and other forms of commercial travel. Mr. Thompson, who has been with Hewitt-Robins since 1936, previously served in the sales department at Buffalo, N. Y., and as manager of New England sales.

◆

HYSTER COMPANY.—*Milton H. Smith* has been appointed supervisor of fork-type lift truck engineering for the Hyster Company. Mr. Smith will have headquarters in the Portland, Ore., home office.

◆

ELECTRO-MOTIVE DIVISION, GENERAL MOTORS CORPORATION.—*E. V. Rippingille, Jr.,* assistant factory manager of the Electro-Motive Division of the General Motors Corporation, has been appointed manager of Plant No. 2, a recently acquired building at Chicago. Mr. Rippingille was born at Brooklyn, N. Y., and received his higher education at the University of Berlin, Germany. Upon his return to America he received his training as a mechanical engineer at the General Motors Institute, Flint, Mich., and from there he went to the Cleveland Diesel engine division of General Motors (then known as Winton) and worked on the assembly of Diesel engines. In May, 1937, Mr. Rippingille joined Electro-Motive as foreman of the blower manufacturing department. A short time later he became assistant plant engineer. In 1940 he was placed in charge of the manufacturing



E. V. Rippingille, Jr.

project for the General Motors "Pancake" Diesel engine for use of the Navy, and in June, 1942, he was appointed assistant factory manager.

◆

PULLMAN-STANDARD CAR MANUFACTURING COMPANY.—*Wallace N. Barker* has been elected to the newly-created position of executive vice-president of the Pullman-Standard Car Manufacturing Company. Mr. Barker was born at Michigan City, Ind., on November 30, 1897. He received his higher education at Yale University, and served as a lieutenant of field artillery in World War I. He entered the car-building industry in 1920 in the engineering department of the Haskell & Barker Car Co., at Michigan City. Two years later, when the Pullman Company purchased



W. N. Barker

Haskell & Barker, he was transferred to the former company's executive offices at Chicago. In 1926 he was appointed assistant to the vice-president of what was then known as the Pullman Car & Manufacturing Co., and four years later became assistant to the president. In 1931, during the process of merging Pullman Car and the Standard Steel Car Company, he served as assistant to the president of both concerns. Since December of 1934 he has been a vice-president in charge of all manufacturing for Pullman-Standard and director of plant operations at Michigan City, Ind., and Hammond, Butler, Pa., Bessemer, Ala., Worcester, Mass., and Chicago.

◆

CHAMPION RIVET COMPANY. — The Champion Rivet Company, Cleveland, Ohio, manufacturer of welding electrodes, has made the following appointments for the sale of its welding products: *F. J. Sweeney,* for the Cleveland and Akron, Ohio, district; the *Terminal Engineering & Supply Co.,* Pittsburgh, Pa., for the Pittsburgh district, and the *Norton Welding Equipment Company,* Milwaukee, Wis., for the state of Wisconsin.

◆

EATON MANUFACTURING COMPANY. — *Robert F. Golden,* formerly assistant to the president of the National Lock Washer Company, has been appointed head of the newly established research and development department of the Eaton Manufacturing Company. The new department will be located at Massillon, Ohio, and will be de-



Robert F. Golden

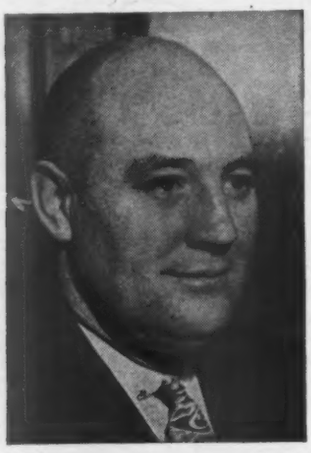
voted to research and development on lock washers, spring-lock washers, snap, bearing, lock and retainer rings, and other production fastening devices. *Kenneth I. Silvis,* with Eaton's Reliance division since 1935, and for the past five years in the cost and payroll department, has been transferred to the snap-ring sales department.

The Eaton Company has also announced the addition of four men to the sales department of the Eaton Reliance division: *Ralph O. Amsden, Jr.,* with headquarters at Detroit; *John S. Kerr,* with headquarters at Cleveland; *John L. Knott,* with headquarters at New York; and *Clifford A. Eisenhart,* western railroad representative with headquarters at Chicago.

◆

AMERICAN BRAKE SHOE COMPANY.—*J. F. Weller* has been appointed to the newly created post of sales assistant to the president of the American Brake Shoe Company. When the Brake Shoe organization took over its present Kellogg division in 1939, Mr. Weller was division president and remained in this position until 1945. In 1943 he was appointed director of automotive sales for both the Kellogg division and the American Brakeblok division. He will represent the entire company in his new position.

YALE & TOWNE MANUFACTURING COMPANY.—*Robert J. McGreevy,* recently discharged from the Navy, where he served as a lieutenant in the materials handling section of the Bureau of Supplies & Accounts, has been appointed assistant district manager of industrial truck sales-engineering of the Yale & Towne Manufacturing Co., for the metropolitan New York area.



Robert J. McGreevy

He will be associated with Carl E. Lang, recently appointed New York district manager of industrial truck sales-engineering, with offices in the Chrysler building. Mr. McGreevy joined Yale & Towne in 1940 in the Pittsburgh, Pa., office and was transferred immediately after the Pearl Harbor attack to Washington, D. C., as industrial engineer to supervise the distribution of materials-handling equipment to the armed forces. He enlisted in the Navy in November, 1943. Mr. McGreevy made important contributions to the materials handling services of the Navy and its industrial suppliers. He edited the Navy's Materials Handling Handbook.

◆

MONTREAL LOCOMOTIVE WORKS, LTD. — The election of three new officers and a director of the Montreal Locomotive Works, Ltd., a subsidiary of the American Locomotive Company, has been announced by R. B. McCall, president. *W. L. Lentz* has been elected vice-president in charge of manufacturing; *W. M. Townsend,* vice-president; and *W. J. Niles,* assistant secretary-treasurer. *J. D. Vaughan* has been elected to the board of directors. Mr. Lentz and Mr. Vaughan are also, respectively, vice-president in charge of manufacturing and comptroller of the parent firm, with headquarters in New York. *Charles Madely* succeeds Mr. Townsend as works manager. Mr. Townsend has been with Montreal Locomotive since 1903 and has served as toolmaker, tool-room foreman, small tool supervisor, and general supervisor of production of shop methods and extra work orders. He became superintendent of the Montreal plant in 1937 and was appointed works manager in 1939. Since 1917, Mr. Niles has been affiliated with Montreal Locomotive and has held important positions in the works manager's office, extra work-order department and in production scheduling and control. During World War II he was appointed assistant to the works manager.

BUDD COMPANY.—A corporation known as the Budd Company has resulted from the merger on June 12 of the Edward G. Budd Manufacturing Company and the Budd Wheel Company. The new company owns all the assets and business, is subject to all the liabilities of the two former companies, and is to be operated in four principal divisions—automobile body, railway, wheel and induction heating. The railway division designs and builds stainless-steel trains for all types of passenger cars, including sleeping cars, reclining chair coaches, dining, lounge and observation cars. The induction heating division, with a separate new plant in Detroit, builds apparatus for the heating of metals by electrical induction for heat-treating or forging.

Maj. Gen. Gladeon M. Barnes, retiring assistant chief of ordnance of the United States Army, has joined the Budd Company as engineering assistant to the president. *Percy R. Keller,* formerly manager of miscellaneous sales of the General Steel Castings Corporation at Washington, D. C., has assumed his new duties as an assistant railway sales manager for the Budd Company. Mr. Keller, who has been engaged in various railroad activities for the past sixteen years in New York and Pennsylvania, will make his headquarters in the Philadelphia, Pa., office. *Joseph F. Clary,* an assistant railway sales manager, formerly of the



Percy R. Keller

Philadelphia office, has been transferred to the position of assistant railway sales manager at Chicago. *Robert A. Sherman,* formerly district railway sales manager in the St. Louis office, has been appointed regional railway sales manager with headquarters in St. Louis.

Maj. Gen. G. M. Barnes, who was responsible for the development of 1,600 of the 1,800 major ordnance items used by the army against Germany and Japan, has resigned after more than 30 years in the service. In his new position, General Barnes will represent President Edward G. Budd in development engineering connected with the company's business of building stainless-steel railroad passenger cars and automobile-body assemblies and stampings.

◆

GENERAL MOTORS CORPORATION.—An instruction film dealing with the care and maintenance of railroad journal boxes for Diesel locomotives has recently been released by the Hyatt Bearings Division of General Motors. The sequences for this sound motion picture were made through the cooperation of the Erie Diesel shop, the Mt. Clare Baltimore & Ohio shops, and the Southern.

The film opens with a locomotive coming in for routine check at one of the new two-level type modern Diesel shops, then shows the trucks lowered and conveyed to the work track where the boxes are dismantled, cleaned, inspected and reassembled on the trucks and again ready for the rails. Correct methods of race and wheel removal as well as all the up-to-date equipment for handling, servicing and storing of roller-bearing journal boxes and parts are clearly and completely demonstrated.

The Electro-Motive Division of General Motors is showing the film on instruction cars and in other training work. It is a standard 16 mm. film with sound track; and the running time is about 20 min. Prints are available on loan through the Electro-Motive Division. LaGrange, Ill., or the Hyatt Bearings Division, Harrison, N. J.

◆

IRON & STEEL PRODUCTS, INC.—*George L. Bladholm,* recently released from the armed forces, has been appointed special representative of Iron & Steel Products, Inc., with headquarters in the company's general offices, Hegewisch Station, Chicago 33. *Charles A. Marshall* has been appointed general manager.

◆

A. M. BYERS COMPANY.—*Alfred B. Drastrup* has been appointed manager of the alloy-steel sales department of the A. M. Byers Company of Pittsburgh, Pa. Mr. Drastrup has been associated with the company since 1931 in accounting, industrial engineering and plant management capaci-



Alfred B. Drastrup

ties and previously was with the Columbia Steel Company, Torrance, Calif., and the Gary works of the United States Steel Corporation, Gary, Ind. Born in Denmark, Mr. Drastrup received his education in business administration and accounting both in that country and the United States. Production of alloy steel by the company was started in 1941 to complement the manufacture of wrought-iron products, in which it has been engaged for more than 80 years. Facilities for the production of hot-rolled and cold-drawn alloy-steel bars and wire are now being installed at the company's Ambridge, Pa., plant, and will be ready for initial operations the latter part of this year.

A Mark of Merit



The next time you see the words "Member, Association of Manufacturers of Chilled Car Wheels" in an advertisement or on a letterhead, here's a thought to bear in mind. The company advertising to you or writing to you has voluntarily agreed to be bound by a rigid code to the highest and most advanced standards of wheel manufacture today. Failure to comply forfeits membership.

Membership in the AMCCW is a practical factor to be considered in selecting wheels. It tells you where to look for a wheel that has passed the following rigid tests; chill block tests, drop tests, chemical analyses, processing temperature checks, thermal tests, rotundity tests and hardness tests . . . and only recently a new *extra* check for maintenance of rotundity.



AMCCW

ASSOCIATION OF MANUFACTURERS OF CHILLED CAR WHEELS

Organized to achieve Uniform specifications — Uniform inspection — Uniform product

SIMMONS-BOARDMAN PUBLISHING CORPORATION.—*C. Miles Burpee* was elected a vice-president of the Simmons-Boardman Publishing Corporation by the board of directors at its meeting in New York on May 20. Effective with his election, Henry Lee, president, announced that Mr. Burpee had been placed in charge of sales of advertising in all the corporation's railway publications, with headquarters in New York. *John S. Vreeland,* eastern engineering editor of Railway Age and eastern editor of Railway Engineering and Maintenance, has been appointed sales representative for the railway publications, with headquarters as before in New York. These publications include Railway Age, *Railway Mechanical Engineer,* Railway Engineering and Maintenance, Railway Signaling, and the Locomotive, Car Builders', and Railway Engineering and Maintenance Cyclopedias.

The Dallas office of the Simmons-Boardman Publishing Corporation has been moved to larger quarters at 2909 Maple avenue, Dallas 4, Tex. The office continues in charge of *J. Sanders.*

C. Miles Burpee was born at Edmundston, N. B., Canada, and attended the University of New Brunswick, from which he received the degrees of B. Sc. in C. E. in 1923 and M. Sc. in C. E. in 1926. His early railway experience was gained during the summers of 1918-20 when he was employed successively as assistant building inspector, ballast-pit clerk, chainman, rodman and instrumentman on the Edmundston division of the Canadian National. He was employed as resident engineer in charge of highway construction for the department of public works of the Province of New Brunswick during the summers of 1921-23. He joined the faculty of the engineering college of Marquette university, Milwaukee, Wis., as instructor in surveying, descriptive geometry and mechanical drawing in the fall of 1923 and resigned the following year to enter the employ of the Delaware & Hudson as bridge and building supervisor of the Pennsylvania division on July 1, 1924. He was appointed track supervisor at Oneonta, N. Y., in 1925, served as acting bridge and building master at Plattsburg, N. Y., in 1926 and in the fall of that year became bridge and building supervisor in charge of building and structural work in connection with the modernization of locomotive terminal facilities and freight car construction shops at Oneonta. He was promoted to bridge and building master of the Saratoga division on January 1, 1928, and was appointed purchasing engineer at Albany, N. Y., in 1930. In May, 1933, he became research engineer and his duties were expanded to include the purchase and supervision of the inspection of all forest products in addition to applied research in conjunction with the procurement and use of all materials and supplies. During 1937 he served as vice-president in charge of the railroad division of the Chipman Chemical Company, while on leave of absence from the D. & H. He returned to his former position that fall and in November, 1938, resigned to join the Chicago staff of Simmons-Boardman as managing editor of the Railway Engineering & Maintenance Cyclopedia. In August, 1943, he was appointed purchasing and stores department editor of Railway Age; in September, 1944, editor of Railway Engineering & Maintenance Cyclopedia, and in November, 1945, also executive assistant. Mr. Burpee has been an active member of the American Railway Engineering Association, the Purchases & Stores division of the Association of American Railroads, the American Wood-Preservers' Association (of which he is chairman of the publication committee and member of the nominating committee), the American Railway Bridge & Building Association (of which he was president in 1937-38), the Railway Tie Association, and the Roadmasters' & Maintenance of Way Association (of which he is a former director).



C. Miles Burpee

◆

VULCAN IRON WORKS. — *Thomas H. Fawcett* has been appointed sales engineer of the locomotive division of the Vulcan Iron Works, Wilkes-Barre, Pa. Before joining Vulcan, Mr. Fawcett had been with the Baldwin Locomotive Works for nearly thirty years, serving successively as draftsman, designer, engineer and sales engineer, locomotive division. Mr. Fawcett will also supervise an extensive program of expansion and standardization for Vulcan.



Thomas H. Fawcett

◆

AMERICAN CAR AND FOUNDRY COMPANY. —*Frederick A. Stevenson, president* of the *American Car and Foundry Company,* has been elected a member of the executive committee.

E. B. Carpenter, who has been appointed district sales manager of the St. Louis, Mo., office of the *American Car and Foundry Company* as announced in the June issue, was born in Providence, R. I. He is a graduate of the Providence Technical high school and of the Worcester (Mass.) Polytechnic Institute with a degree in mechanical engineering. He joined American Car and Foundry in August, 1927, as a shop student at the Berwick, Pa., plant and in April, 1928, was transferred to St. Louis as sales agent for the St. Louis foundries. In May, 1940, he was appointed sales agent at the St. Louis office, having charge of miscellaneous and railroad car sales.



E. B. Carpenter

◆

DAMPNEY COMPANY OF AMERICA.—*Kenneth E. Greene* and *William T. Campbell* have been appointed members of the sales staff of the Dampney Company of America, Hyde Park, Mass. Mr. Greene will have headquarters in the company's Chicago office and Mr. Campbell will be located in the Philadelphia office.

Obituary

WALTER W. WILSON, vice-president of the Roth Manufacturing Company (manufacturing subsidiary of the Vapor Car Heating Company, Chicago), died at his home in Oak Park, Ill., on May 12.

◆

F. K. MURPHY, vice-president of the Hanna Stoker Company, with headquarters at Cincinnati, Ohio, died recently in that city.

◆

TOM W. AISHTON, district sales manager for the National Malleable & Steel Castings Co., at Chicago, died on June 1, in an Evanston (Ill.) hospital.

◆

RUDOLPH LOUIS SUHL, manager of the nickel sales department of the International Nickel Company at New York, died on June 10, at his home in Plainfield, N. J. Mr. Suhl was 64 years old.

◆

FRANKLIN H. SMITH, treasurer and a director of the Gold Car Heating and Lighting Co., Bush Terminal, Brooklyn, N. Y., died on May 18, in the Yonkers (N. Y.) General Hospital. Mr. Smith, who was born in New York, was 70 years old. He began his career in the executive offices of the New York Central, and

39

LIMA-BUILT 2-8-4 STEAM LOCOMOTIVES

speed PERE MARQUETTE traffic



TO meet steadily increasing demands for more rapid movement of heavy freight traffic, Pere Marquette has continued to add to its fleet of Lima-built 2-8-4s, so that today thirty-nine of these modern steam locomotives are speeding the freight service on its lines.

LIMA LOCOMOTIVE WORKS LIMA LOCOMOTIVE WORKS INCORPORATED INCORPORATED, LIMA, OHIO

had been connected with the Heating & Lighting Co. for 37 years.

◆

EMMANUEL WOODINGS, vice-chairman of the board of the Woodings Forge & Tool Company and the Woodings-Verona Tool Works, died at Pittsburgh, Pa., on May 8. Mr. Woodings began his career as an apprentice machinist in the shops of the Verona Tool Works (now a part of the Woodings-Verona Tool Works). After 14 years in the shops, he advanced to the positions of foreman, general manager, vice-president and president. In 1924 he left the Verona Tool Works to form his own company, the Woodings Forge & Tool Co., which in 1931 became associated with the Verona Tool Works.

Personal Mention

General

LEO B. GEORGE, works manager of the Weston shops of the Canadian Pacific at Winnipeg, Man., has been appointed assistant superintendent of motive power and car department, western lines, with headquarters at Winnipeg. Mr. George was born on April 14, 1896, at Ashton-in-Makerfield, England. He entered railway service on December 5, 1910, with the Canadian Pacific and was employed as a messenger, clerk, and machinist apprentice in the mechanical department at Vancouver, B. C., until September, 1914, when he enlisted with the Canadian Expeditionary Force. In July, 1919, he returned to the Canadian Pacific and completed his apprenticeship. He then served as a machinist and relief locomotive foreman at Vancouver and in August, 1929, became shop foreman at West Calgary, Alta. Mr. George was transferred to Alyth, Alta., in March, 1930, and in July, 1932, became assistant machine shop foreman at the Weston shops. In September, 1934, he was promoted to the position of shop engineer at the Weston shops and in October, 1934, to machine shop foreman. He was general locomotive foreman at Vancouver from July, 1936, until May, 1940, when he was loaned to the Canadian Associated Aircraft Production for Canada in September, 1941, and works manager of the Weston shops of the Canadian Pacific in 1942.



L. B. George

GEORGE A. BENEDICT has been appointed superintendent of motive power and equipment of the Alaska Railroad, with headquarters at Anchorage, Alaska.

A. G. HOPPE, assistant chief mechanical officer of the Chicago, Milwaukee, St. Paul & Pacific, at Milwaukee, Wis., has been appointed to the newly created position of general superintendent of the locomotive and car departments, with headquarters at Milwaukee.

J. O. GREEN, master mechanic of the Gulf, Mobile & Ohio, at Mobile, Ala., has been appointed superintendent of motive power and car equipment, with headquarters at Mobile.

WILLIAM DOUGLAS, assistant works manager at the Ogden shops of the Canadian Pacific at Calgary, Alta., has been appointed works manager at the Weston shops, Winnipeg, Man.

WILLIAM H. WALTMAN, who has been appointed engineer shop plants and machinery of the Chicago, Rock Island & Pacific at Chicago, as noted in the June issue, was born on July 9, 1902, at Terre Haute, Ind. He holds a B.S. degree in electrical engineering from the Rose Polytechnic Institute, of which he is a graduate (1924). He began his career in 1924 in the test department of the General Electric Company at Schenectady, N. Y. He was transferred to Chicago in 1928 and to St. Louis, Mo., in 1930. He was appointed electrical inspector of the Missouri Pacific in 1935 and supervisor of power plants in February, 1939. He became engineer shop plants and machinery of the C. R. I. & P. on March 1, 1946.



W. H. Waltman

Diesel

R. W. BALLARD has been appointed system Diesel supervisor of the Illinois Central. Mr. Ballard, who was recently discharged from the Army as a major, was Diesel engine foreman at Chicago at the time he entered the Army in July, 1942.

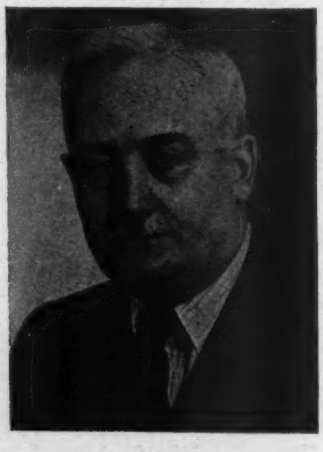
Electrical

W. F. BOWERS, assistant electrical supervisor of the Western Maryland, has been appointed supervisor Diesel locomotive maintenance, with headquarters as before at Hagerstown, Md.

L. H. SULTAN, recently released from the armed forces and former dynamometer car operator, has returned to the Southern Pacific as electrical engineer, motive-power department, with headquarters at San Francisco, Calif.

CLARENCE L. ABRAMS, electrical engineer, motive-power department of the Southern Pacific at San Francisco, Calif., has retired after nearly 41 years of service.

JAMES W. HUGHES, electrical engineer, Eastern lines, of the Canadian Pacific, with headquarters at Toronto, Ont., has been appointed general electrical engineer at Montreal, Que. Mr. Hughes was born at Chatham Center, N. Y., on September 28, 1886, and entered railroading with the Canadian Pacific in 1907 as assistant electrical engineer at the Angus shops. He became electrical engineer, Eastern lines, in 1916, and in that capacity directed the installation of modern electrical equipment



James W. Hughes

craft Company to study aircraft manufacture in England. In September, 1940, he was appointed division master mechanic of the Canadian Pacific at Lethbridge, Alta., and in July, 1941, was loaned to the Canadian federal government as assistant supervisor of Aircraft Production, Department of Munitions & Supply, at Ottawa, Ont. Mr. George was appointed supervisor of

These General Motors Diesel freight locomotives have operated over a total average of 376,570 miles—over-all average availability, 85.2%; average monthly mileage 9,323 — and over a most difficult railroad profile between Winslow, Arizona and Barstow, California. All are 5400 H.P.

LOCOMOTIVE NUMBER	MILES OPERATED	AVAILABILITY	AVERAGE MILES PER MONTH	MONTH DELIVERED
100	607,907	84.2	10,304	1-41
101	602,275	83.9	10,384	3-41
102	508,813	83.8	8,773	3-41
103	495,701	83.7	8,547	3-41
104	482,149	84.5	9,643	11-41
105	417,945	84.6	9,086	3-42
106	425,907	85.7	9,259	3-42
107	423,214	85.6	9,405	4-42
108	422,537	86.2	9,390	4-42
109	419,093	86.6	9,313	4-42
110	423,379	86.9	9,622	5-42
111	410,669	86.8	9,333	5-42
112	402,620	84.3	9,150	5-42
113	363,700	85.7	9,326	10-42
114	349,799	85.4	8,969	10-42
115	343,211	85.3	9,276	12-42
116	334,719	83.9	9,046	12-42
117	322,697	85.3	9,220	2-43
118	313,762	86.4	8,965	2-43
119	289,914	85.1	9,060	5-43
120	296,558	86.7	9,566	6-43
121	276,105	83.7	9,204	7-43
122	279,786	86.8	9,326	7-43
123	271,888	85.5	9,375	8-43
124	269,650	85.6	9,298	8-43
125	265,475	86.4	9,481	9-43
126	259,308	84.5	9,261	9-43
127	265,192	85.1	9,471	9-43

GM LOCOMOTIVES

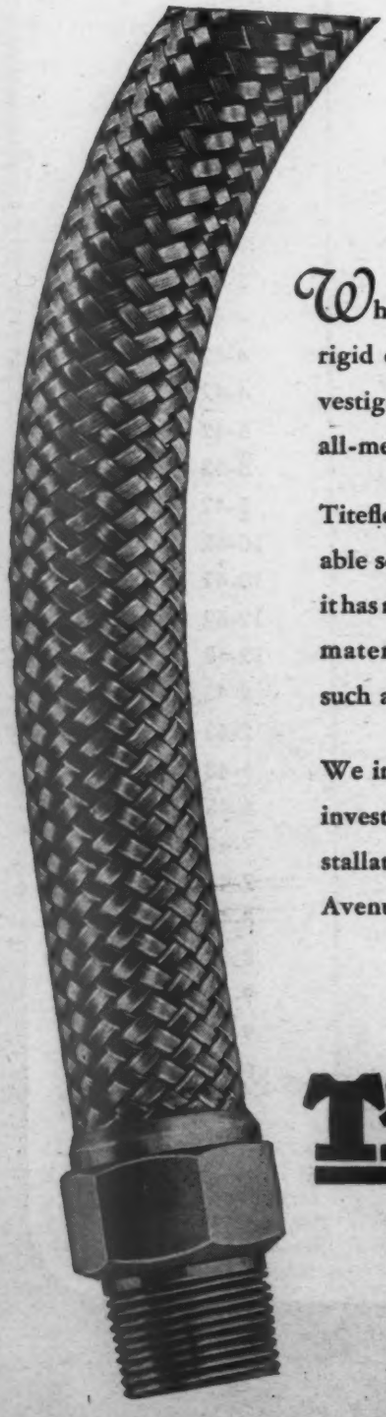
A Cordial Invitation

to the

RAILROAD INDUSTRY

☆

To discuss flexible tubing problems with Titeflex Application Engineers.



Where vibration is causing trouble in rigid oil and air lines we suggest you investigate the advantages of Titeflex, the all-metal flexible tubing.

Titeflex delivers longer-lasting, dependable service because it is all-metal, because it has none of the fast-deteriorating organic materials that might cause failures in such applications.

We invite inquiries from railroad men to investigate the economies of Titeflex installations. Titeflex, Inc., 542 Frelinghuysen Avenue, Newark, New Jersey.

Titeflex

THE ALL-METAL FLEXIBLE TUBING
THAT STAYS TIGHT

on the C. P. R.'s bascule bridge at Sault Ste. Marie.

SIDNEY WITHINGTON, electrical engineer of the New York, New Haven & Hartford, has been appointed chief electrical engineer, with headquarters as before at New Haven, Conn. Mr. Withington was born on June 7, 1884, at Boston, Mass. He is a graduate of Harvard college (1906) and Harvard engineering school (1907). He began his railway career in 1910 as a chainman for the New York, New Haven & Hartford. He then served successively

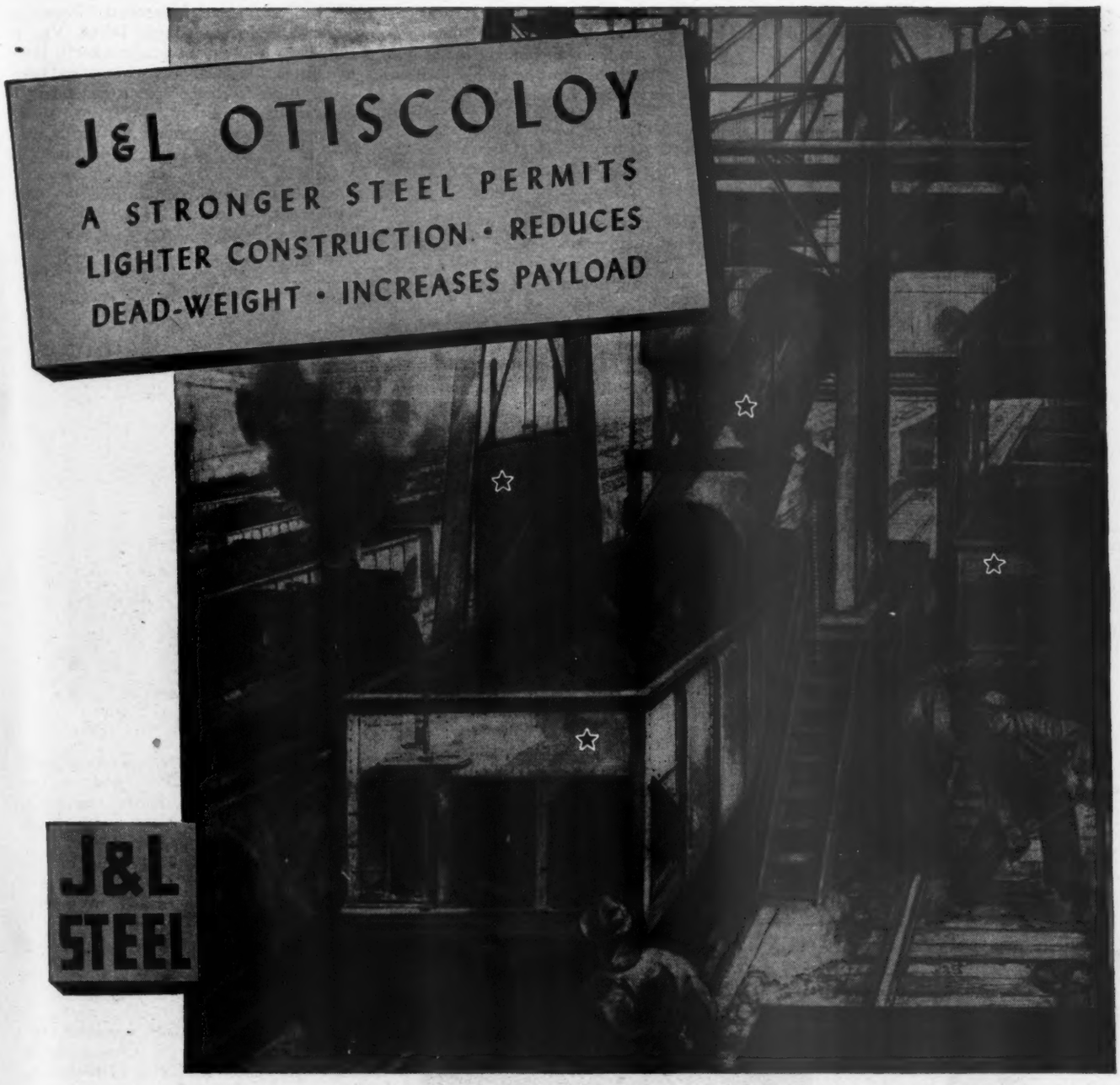


Sidney Withington

as draftsman, inspector, general foreman, assistant engineer, acting electrical engineer, and electrical engineer. During World War I, Mr. Withington served as first lieutenant, Engineers, U. S. Army. He was chairman of the Committee on Electricity, A. R. E. A., from 1929 to 1932; chairman of the Electrical section and second vice-chairman, division IV, Engineering, A. R. A., from 1929 to 1931, and chairman from 1920 to 1924 of the Committee on Heavy Electric Traction, American Electric Railway Association.

JOHN A SHAW has retired after 31 years as general electrical engineer of the Canadian Pacific at Montreal, Que. Mr. Shaw was born in 1876 at Montreal. He is a graduate of McGill University. He entered the service of the Canadian Pacific as an assistant electrical engineer at the Angus shops in 1904; became electrical engineer, Eastern lines, in 1909, and general electrical engineer at Montreal in 1915. During his 42 years' service, Mr. Shaw supervised the Royal York hotel installations, and the design and erection of the million-dollar heating plant for the Toronto terminals, which includes Union station.

H. F. BROWN, assistant electrical engineer for the New York, New Haven & Hartford, has been appointed engineer electric traction, with headquarters as before at New Haven, Conn. Mr. Brown was born on August 17, 1886, at New Haven. He is a graduate of Yale University (Ph. B.) and Sheffield Scientific school (1907). During 1908 and 1909, he was employed in the test department of General Electric Company. He entered railroading in 1910, as a draftsman in the employ of the New Haven, advancing



Otiscoloy is 40% stronger than ordinary steel. Its high strength is obtained without mechanical working or heat-treating which permits great workability. Otiscoloy is also resistant to abrasion and corrosion.

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★ **Otiscoloy used in coal chutes and backstops reduces wear by abrasion and atmospheric corrosion, and eliminates many costly repairs.**

Write for Otiscoloy booklet.



JONES & LAUGHLIN STEEL CORPORATION

PITTSBURGH 30, PENNSYLVANIA

to assistant engineer, electrical department, in 1911. He was named assistant electrical engineer at New Haven in 1922, and engineer, electric traction, on May 15. Mr.



H. F. Brown

Brown is a member of the American Institute of Electrical Engineers, Committee on Land Transportation; of the Electrical Section, Engineering Division, Association of American Railroads, serving on the Committee of Direction (chairman of section 1937-42); and of the A. R. E. A.

Master Mechanics and Road Foremen

CLARENCE A. SHEELER, master mechanic of the Canadian Pacific, Ontario district, with headquarters at Toronto, Ont., has retired after 43 years of service.

D. H. RICHMOND, mechanical inspector of the Chesapeake & Ohio at Huntington, W. Va., has been appointed master mechanic of the Chicago division, with headquarters at Peru, Ind.

J. E. MCLEOD has been appointed master mechanic of the Hocking division of the Chesapeake & Ohio, with headquarters at Columbus, Ohio.

FRANK JACKSON TOPPING, who has been appointed master mechanic of the Chesapeake & Ohio at Huntington, W. Va., as announced in the June issue of the *Railway Mechanical Engineer*, was born on May 10, 1890, at Roanoke, Va. He attended the public schools of Virginia from 1896 to 1907; night schools for two years, and took Correspondence Schools' mechanical courses from 1911 to 1916. He entered his railroad career on June 1, 1906, as a machinist helper in the employ of the Norfolk & Western at Roanoke, Va. He became a machinist apprentice in the service of the C. & O. at Thurmond, W. Va., on June 1, 1907, and was transferred as a machinist apprentice to Huntington on June 1, 1910. He became a machinist on the N. & W. at Williamson, W. Va., on July 25, 1911, and returned to the C. & O. as a machinist at Thurmond on October 1, 1911. On November 15, 1911, he became a machinist in the employ of the Virginian, serving at Princeton, W. Va., and Elmore, until January 15, 1912, when he returned to the N. & W. as a machinist at Roanoke. On August 15, 1912, he again returned to the C. & O. as a machinist at Hinton, W. Va. He was transferred to Huntington as a machinist on September 15, 1912; to Ronceverte, W. Va., as enginehouse foreman on June 15, 1916; to Clifton Forge, Va., as enginehouse foreman on September 1, 1916; to Clifton Forge as a machinist on January 1, 1919; to Ronceverte as general foreman on September 1, 1919; to Clifton Forge as general foreman on July 1, 1923, and to Hinton as general foreman on March 15, 1933. He was appointed assistant master mechanic, Hinton division, with headquarters at Hinton, on October 1, 1937; assistant master mechanic, Cincinnati division, with headquarters at Stevens, Ky., on October 1, 1938; master mechanic, Hinton division, on January 1, 1940; master mechanic, Hocking and Toledo divisions, with headquarters at Columbus, Ohio, on December 1, 1943; and master mechanic, Huntington-Logan divisions, with headquarters at Huntington, on February 1, 1946. During his apprenticeship on the C. & O. at Thurmond Mr. Topping served two months as storekeeper and two months as a locomotive fireman.



F. J. Topping

Car Department

H. M. VISE, JR., has been appointed general car inspector of the Chesapeake & Ohio, with headquarters at Huntington, W. Va.

V. L. SOMMERS has been appointed traveling general car foreman of the Western Maryland, with headquarters at Hagerstown, Md.

T. B. DAVIS, traveling general car foreman of the Western Maryland, with headquarters at Hagerstown, Md., has been appointed master car builder at Hagerstown.

W. E. CORR, superintendent of the car department of the Seaboard Air Line at Norfolk, Va., since 1930, has retired after 34 years of service, because of ill health.

ERNEST O. DICKINSON has been appointed superintendent car department of the Central of New Jersey, with headquarters at Elizabethport, N. J.

HUGH H. YOUNG, whose appointment as superintendent of the car department of the Illinois Central, with headquarters at Chicago, was announced in the June issue, was born at Altamont, Ill., on February 27, 1904. He entered the service of the I. C.,





The World's *Most Powerful*

Diesel-Electric Unit uses American Hammered Piston Rings

Designed for 120 mph speeds, but geared down to an 85 mph top for freight service, Seaboard Railway's new Baldwin-built 3000 HP Diesel Electric packs the most power in one cab of any D-E unit in the world.

Two Baldwin vertical 4-cycle supercharged diesels, 12¾" x 15½", 625 rpm, share the 3000 HP load. The responsible job of converting push into power is entrusted to American Hammered Piston Rings.

You'll find American Hammered Piston Rings serving on most of the major diesel-equipped railroads of the country . . . and you'll find the reason in a record of dependability that comes from years of know-how in making rings for the toughest assignments. As an example: on one famous flier, American Hammered Piston Rings served for 440,000 miles with no attention or replacements. Service like this helps give the high availability that every road is looking for.

You can specify American Hammered Piston Rings on the new locomotives you buy, and order them for replacements on any existing equipment. Over 30,000 types and sizes let us offer rings in every size . . . of every type . . . for every purpose.

American Hammered Piston Ring Division, Koppers Company, Inc., Baltimore 3, Maryland.



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Demonstrating

BRICKSEAL

REFRACTORY COATING



HEATED TO 2250°

Brickseal provides a crackproof, vitrified armor for furnace linings. The small firebricks shown in the furnace were bonded and painted with Brickseal and heated to 2250°. Directly from the furnace they were plunged into cold water as shown below—a test for *any* material subject to expansion and contraction.

Brickseal is *semi-plastic when hot,* yet *hard and tough when cold.* Brickseal is made in grades suitable to heats ranging from 1400° to more than 3000°. It will make any furnace last longer by giving new life to your refractories. Write or call local dealer for a demonstration.



BRICKSEAL

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on October 10, 1921, at Centralia, Ill., and on May 1, 1936, became gang foreman. On



Hugh H. Young

January 1, 1944, he was appointed general car foreman, at Centralia.

O. N. SCHOPPERT, master car builder of the Western Maryland at Hagerstown, Md., has retired after 45 years of railroad service.

Obituary

C. F. DENO, assistant superintendent of motive power, Western Lines, Canadian Pacific, died on March 19.

ELMER HOLMQUIST, who retired on October 1, 1943, as master mechanic on the Wisconsin division of the Chicago & North Western, with headquarters at Chicago, died in that city on May 11.

Trade Publications

Copies of trade publications described in the column can be obtained by writing to the manufacturers, preferably on company letterhead, giving title. State the name and number of the bulletin or catalog desired, when it is mentioned.

BEAVER PIPE TOOLS.—Beaver Pipe Tools, Warren, Ohio. Condensed four-page catalogue covering current line of Beaver equipment, with prices.

◆

"GRANNY GRIP".—Boyer-Campbell Company, 6540 St. Antoine, Detroit 2, Mich. Four-page bulletin illustrates "Granny Grip" which is described as a cam-lever mechanism and chain that grabs up heavily laden steel barrels, steel plates, etc., with a vise-like grip. Furnished in single-strand and double-strand units with Herc-Alloy chain.

◆

ACCESSORIES AND ATTACHMENTS.—Giddings & Lewis Machine Tool Co., Fond du Lac, Wis. Forty-six-page loose-leaf book contains specifications and descriptive data on time-saving and labor-saving attachments and accessories for use with G. & L. horizontal boring, drilling, and milling machines. Lists also structural features and typical applications.

◆

ANHYDROPRENE WIRES AND CABLES.—Simplex Wire & Cable Co., 79 Sidney street, Cambridge 39, Mass. Illustrated data sheet gives information about neoprene jacketed Anhydrex insulated wire and cable.

◆

SHAKEPROOF FASTENERS. — Shakeproof, Inc., Division of Illinois Tool Works, 2501 North Keeler avenue, Chicago 39. Eight-page bulletin contains engineering and procurement data on the new Shakeproof Q-Two quick-operating fastener for removable and hinged panels.

◆

BUDA JACKS.—The Buda Company, Harvey, Ill. Bulletin 1040D describes and illustrates all the various models and types of Buda ratchet, screw and hydraulic jacks.

◆

SHEAR CATALOGUE. — The Cleveland Crane & Engineering Co., Heavy Machinery Division, Wickliffe, Ohio. Catalogue No. 20110 covers Steelweld pivoted-blade shears which are said to be entirely new and radically different from other metal-cutting shears.

◆

SHOT PEENING.—Pangborn Corporation, Hagerstown, Md. Sixteen-page booklet, "Shot Peening—What It Means to You", illustrated with drawings, charts, and photographic reproductions, covers the use of Shot Peening for increasing fatigue life of metals. Gives performance data.

◆

AIRCO FLAME-HARDENING APPARATUS.—Air Reduction Sales Company, New York City 17. Catalog No. 90 describes design and use of Airco flame hardening apparatus. Items vary from simple water-cooled torches and tips for hardening small parts to complete apparatus for use on large jobs. Catalogue includes equipment for gear hardening and hardening of both internal and external rounds, as well as flat surface hardening, and lists a variety of manifold, regulators, valves and seals.

◆

"LIGHTING ON THE RAILROAD."—General Electric Lamp Dept., Nela Park, Cleveland, Ohio. Brochure No. Y-610 takes the reader on a quick "tour" of specific lighting applications for passenger cars, classification yards, shops, control panels, locomotives, etc. Intended to "clear the way" for a more technical railroad lighting booklet now in production.

◆

BATTERIES FOR TRAIN COMMUNICATION.—Edison Storage Battery Division of Thomas A. Edison, Inc., West Orange, N. J. Illustrated bulletin contains information on the types of nickel-iron-alkaline cells recommended for batteries for operating train-communication equipment in caboose cars, the number of cells required to supply desired potentials and electrical data, weights and dimensions of cells of all types and their construction features. Gives also suggestions for proper installation, ventilation and charging of batteries.